Overall Study on
Reviewing the Progress and Evaluating
The Information Technology in Education (ITEd) Projects
1998/2003

Final Report

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The Hong Kong Polytechnic University Project Team
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Executive Summary

This Executive Summary is drawn from the full report "Whole Final Report of the Overall Study on Reviewing the Progress and Evaluating the Information Technology in Education (ITEd) Projects 1998/2003". *This document provides the main elements of the purposes, methodology, analysis and recommendations from the full report. Detailed data supporting the conclusions and recommendations are reported in the main body of the report but not included here due to the large quantity of data from multiple sources. Readers are invited to read the full report for details.*

Background of the Study

The following summarises the main purposes, methodology, as well as the major findings and recommendations of the "Overall Study on Reviewing the Progress and Evaluating the Information Technology in Education (ITEd) Projects 1998/2003". This project was commissioned by the Hong Kong SAR Government to review the progress of the Information Technology in Education (ITEd) projects in Hong Kong since the inception of the *Information Technology for Learning in a New Era: Five-Year Strategy 1998/99 to 2002/03*, (the *Five-Year Strategy*) in 1998. The main purposes of the project were:

1. to review the progress of the ITEd projects,
2. to evaluate the application and effectiveness of ITEd in the light of the extent to which schools/teachers have adopted and implemented pedagogical practices that use technology and the vision of promoting ITEd has been met as reflected by teachers' and students' enablement in their teaching/learning processes,
3. to conclude the overall effectiveness of ITEd projects and recommend strategies and plans for future investment and implementation in ITEd in Hong Kong.

Methodology

The research design for this Study was a cross-sectional exploration at the final stage of the ITEd initiatives. Data were collected by a combination of quantitative and qualitative methods. Quantitative instruments, including Questionnaire Surveys, IT Literacy Assessment and IT Activity Daily Log were used to give a broad picture while the qualitative instruments, including observations, focus group and individual interviews, and document analyses, were used to probe more deeply into the phenomenon, enable triangulation of data and give examples of unique uses. Results were compared with relevant data from the international Second Information Technology in Education Module One Hong Kong Study conducted in 1998 (Law et al., 1999) and the *Preliminary Study on Reviewing the Progress and Evaluating the Information Technology in Education (ITEd) Projects* (CITE, 2001) and, where appropriate, international data to review the progress and achievements of the ITEd initiatives in Hong Kong.

All government and aided schools in the Primary (n=684), Secondary (n=413) and Special School (n=72) Sectors were surveyed by the School Information Technology Survey Form and the School Heads' Questionnaire. A total of 616 (90%), 378 (92%) and 66 (92%) completed School Information Technology Survey Forms were returned for the Primary, Secondary and Special School Sectors respectively. The numbers of valid returns for the School Heads' Questionnaire for the Primary, Secondary and Special School Sectors were 625 (91%), 372 (90%) and 66 (92%) respectively. Teachers (including therapists/specialists of special schools), IT team members and students from 124 primary, 125 secondary and 25 special schools took part in a questionnaire survey through stratified sampling. The number of valid returns and the corresponding response rates for the Teachers' Questionnaire were Primary: 3,727 (90%), Secondary: 6,497 (91%), and Special: 641 (97%). A total of

60 (97%) Specialists'/Therapists' Questionnaires from the Special School Sector were also received. For the IT Team Members' Questionnaire, the corresponding returns and response rates for the three sectors were: Primary: 603 (90%), Secondary: 668 (91%), and Special: 109 (96%). Furthermore, 4,912 primary students, 5,943 secondary students and 376 special school students responded to the Students' Questionnaire, with the respective response rates of 98%, 92% and 99% for the three sectors. 20 primary, 21 secondary and 10 special schools involved in the teachers' and students' questionnaire surveys were selected for further in-depth study including a school tour, classroom observations, school document analyses, IT Literacy Assessment and IT Activity Daily Log for students, and Parents' Questionnaire (for primary and secondary schools).

Individual or focus group interviews were also conducted with selected school heads, teachers, students, parents (in the case of special schools) and representatives from community stakeholder groups including trade associations, education and IT-related associations, teachers' associations, school heads' associations, school sponsoring bodies, tertiary education institutions, NGOs with parent education services, ITEd project officers and policy makers/directorates. An analysis of documents submitted by EMB to the Project Team was carried out.

Summary of Findings

Overall, the study found that significant progress has been made in the infrastructure, teacher professional training, and curriculum and resource support for ITEd in the five-year period 1998/2003.

Access, connectivity and usage

1. As far as infrastructure is concerned, the numbers of computers and other hardware in schools have continued to improve and have far exceeded targets. The average numbers of computers per school are 89.8, 237 and 71 for the Primary, Secondary and Special School Sectors respectively, placing Hong Kong well internationally in terms of infrastructure. Connectivity in school has improved greatly. All schools reported having Internet connections. Among them 95.8% (primary schools), 97.6% (secondary schools) and 93.9% (special schools) reported that the Internet connection was broadband. However, not every individual classroom has network connection. Student to computer ratios have also improved, with gross ratios of 7.4, 4.6 and 2 students per computer in the Primary, Secondary and Special School Sectors respectively. These figures are comparable to those in most developed countries. Nevertheless, some concerns have been expressed that existing network and hardware infrastructures are already getting old and that there is a need to make provision for ongoing maintenance/replacement of these.

2. One of the impressive findings of the study is that home access and connectivity for school heads, teachers and students have improved greatly and there is now a high level of home ownership of computers, even for students. There has been increasing use of IT by school heads, teachers and students, both in school and at home. Over 96% of school heads make at least some daily use of IT at school and 94% or more at home. For teachers, over 96% make some daily use of IT at school and over 97% at home. For primary school students, 22.2% of P3 and 22.8% of P6 reported using computers for more than one hour per day at school and 45.9% and 71.9% respectively for more than one hour per day at home. In the Secondary School Sector, 17.7% of S2 students, 12.1% of S4 students and 11.1% of S6 students reported more than one hour's use per day at school and 83.2%, 87.1% and 82.1% respectively for more than one hour daily at home. 30.4% of special school students reported daily use of more than one hour at school and 45.1% at home.

3. The majority of computers in primary and secondary schools are located in special rooms. The number of computers located in general classrooms has steadily increased but is still relatively low (with average numbers of permanent computers in general classrooms of 11.8 per primary school, 10.5 per secondary school and 8 per special school). This may create a barrier to more integrated use of IT across subject curricula.

4. Some special schools expressed a concern that resources are insufficient for meeting the unique needs of their students. For some special school students, home access is a problem because of the need for assistive devices that they do not have available for home use or which parents or other supporters at home are not trained to use.

5. Most of the schools have school websites (97.2%, 99.7% and 95.5% of primary, secondary and special schools respectively). The proportions of schools having subject/teaching websites are relatively lower (52.1%, 88.4% and 45.5% respectively).

Teacher enablement

1. As far as teacher training is concerned, most teachers have received training in ITEd, with all of those who responded to this item reporting to have completed at least basic (BIT) level and 89.2% of primary, 89.3% of secondary and 92.2% of special school teachers having reached intermediate (IIT) level or above. In spite of the high percentage having completed training, however, only 54.1%-68.7% rated themselves proficient in applying/integrating IT in their subject curricula and there were still 15.7%-28.2% of teachers who considered themselves non-users/novices/beginners in adopting IT in teaching.

2. It was reported in the teachers' focus group interviews that teachers feel they need less training with regard to technical expertise and more focus in their professional development on effective pedagogical use of IT and sharing of experiences with subject-based colleagues. Special school teachers and specialists/therapists suggested that there is insufficient training provision to meet their unique needs. Special schools are concerned with development of social skills, self-care and communication as well as cognitive learning, and the role of IT may be different for each of these purposes. Therefore, there is a need to redefine the role of IT in serving different functions rather than just the perception of using IT as a tool for cognitive learning in special schools.

3. From 76.8% to 87.3% of teachers reported that they had experienced restrictions imposed by insufficient time and excessive workload. In the focus group interviews with teachers it was also revealed that the pressures of the public examination-driven system were another common reason for not incorporating IT into their teaching.

4. Ongoing technical support as well as support in locating and evaluating suitable teaching software is considered by school heads and teachers to be of utmost importance.

Curriculum, pedagogy and resources

1. There is clear evidence of increasing use of IT by teachers, particularly for searching for information and preparing notes/course materials for teaching purposes. There is also evidence of increasing use of IT in teaching and learning across KLAs since the Preliminary Study. In the Primary School Sector, with the exception of Physical Education, from 82.4% (on Art) to 97.6% (on English) of school heads reported using IT in KLAs occasionally or always. Similarly, in the Secondary School Sector the range reported by school heads, again with the exception of Physical Education, was from 91.8% (on Chinese) to 98.7% (on Science). Where IT was reportedly used in classrooms, most of the reported use was by teachers. There was, however, evidence of some degree of encouragement or request from teachers for students to perform a variety of learning-related tasks with IT.

2. Teachers' pedagogical use of IT has been found to be related to a number of factors including school IT resources and support, their own IT beliefs and competence and, to a lesser extent, school heads' beliefs and school IT culture. Since teachers' pedagogical use has been shown to have a relationship to students' learning outcomes, what the teacher does with respect to developing activities that require students to make effective use of IT in meaningful learning

tasks beyond the school context is of paramount importance.

3. Actual classroom use of IT is still more related to teacher-centred rather than student-centred learning, involving predominantly didactic expository teaching such as explanation and demonstration. There was relatively less opportunity for individual interaction with computers and even less for collaborative interaction focusing on facilitating learning and assessment or for tasks requiring higher-order thinking skills. There appears to be very little paradigm shift having occurred since the Preliminary Study. Use of IT for assessment and evaluation is still not a common practice. However, some effective use of IT for supporting student-centred learning in class was observed during Classroom Visits. It is also pleasing to note that a significant proportion of teachers reported having encouraged or requested their students to use IT for self-learning and engaging in collaborative projects outside classes.

4. While large percentages of schools are using school websites for purposes such as communication of information within the school and storing teaching, training and learning materials, there were fewer incidents of school websites being used widely in the teaching and learning process for promoting interaction or engaging students in learning-related tasks.

5. School heads and teachers generally have high perceptions about the impact of IT on teaching, although school heads tended to have more positive views of IT in education than the teachers.

6. Around 80% or more of the school heads suggested that the greatest support needed is for increasing/upgrading computers, peripherals and software, thus implying that resource is still perceived by heads as one of the main concerns. Relatively lower, but still a large percentage of school heads (more than 60%) recorded the need for supporting teaching-related issues such as integrating IT into the school curriculum, using IT in teaching/assisting teaching, enhancing the IT skills of teachers and students or using IT to support students with individual needs.

School and wider community culture

1. There seems to be a growing culture of use of IT by school heads, teachers, specialists/therapists and students both in school and outside school, and parents in general are supportive of ITEd.

2. Most school heads reported a positive impact of IT on school administration and management, with 94% or more agreeing that ITEd has had an impact on school administration or management with respect to improved communication within and outside the school, improved management of student and teacher records and improved management of teaching and learning resources.

3. As well as the above mentioned increased IT culture within schools, there is also an increased culture for sharing among schools. 97% or more of the schools surveyed reported having organized at least some activities to promote IT culture within and among schools. However, to date there is less evidence of a wider community sharing beyond schools. For example, there were not many indications of parent and other community involvement in developing school IT plans.

Student learning

1. Student use of IT at home is much higher than their use in school. Students reported that they used IT mainly for entertainment and searching information outside school; but also for learning-related work. There has been an increasing use of IT, by students, for learning – mainly for information searching – although some teachers and community stakeholders have suggested that students’ information processing skills are not being fully developed. It is interesting but not surprising that there is a pattern of decreasing use of IT in school for upper-level secondary students.

2. The majority of students have developed confidence in using IT, with fewer than 20% of respondents indicating that they feel not quite confident or not confident at all. The majority of students demonstrated a basic understanding of computer knowledge and skills relevant to the stage-specific IT Learning Targets (with 83.3%, 85.7%, 88.6%, 88.1% and 93.9% of students scoring 50% or more in ITLA Section 1 for P3, P6, S2, S4 and S6 respectively), and rated themselves as at least basically competent in common hardware and software skills. From the classroom observations there is evidence to suggest that use of IT alone is not a guarantee of student interest. Real motivation and interest come from carefully designed interaction with teachers, peers and materials, supported appropriately by IT.

3. Students' learning outcomes have been found to be related to a wide range of community, school, teacher and student factors. It is particularly interesting to note that students' time spent on using IT for learning-related tasks outside school is related to 4 and 5 out of the six student learning outcome variables at primary and secondary school levels respectively[1]. However, the students' time spent on using IT for learning at school has no significant relationship with student learning outcome variables at primary school level and relates to only two [of which one is a negative relationship] at secondary school level[2]. In both Primary and Secondary School Sectors, 5 of the 6 variables of students' learning outcomes are positively related to home ownership of computers by students[3].

4. There are little data from the present study to show if students have become more inquisitive or creative, developed capabilities for processing information effectively and efficiently or developed skills for independent lifelong learning, because of the lack of valid and reliable measures of the above and the paucity of baseline data.

Recommendations

It must be remembered that the ITEd initiatives have been in place for only five years and within those five years it has, of necessity, taken time for things to build up. So, depending on the stage of development of the school, we are really talking about what has occurred in less than five years. From the findings reported above, it is undeniable that there has been huge progress in ITEd in Hong Kong schools, as reflected by the significantly improved infrastructure, the high proportion of staff trained, the emergence of a culture of using computers by school heads and teachers in their daily work, the widespread use of computers by students for learning as well as for other purposes, and the general perceptions of school heads, teachers, students, parents and other community stakeholders about the

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1 Regarding the six students' learning outcome variables [students' IT competence, students' perception of positive impact of IT on them, students' confidence in IT use, students' IT literacy (generic competence for learning), students' IT literacy (generic competence for solving daily problems) and students' IT literacy (technical knowledge and skills)], significant correlations have been found between –

(a) students' time spent on using IT for learning-related tasks outside school and 4 of the six variables [students' IT competence, students' perception of positive impact of IT on them, students' confidence in IT use and students' IT literacy (generic competence for solving daily problems)] at primary school level; and

(b) students' time spent on using IT for learning-related tasks outside school and 5 of the six variables [students' IT competence, students' perception of positive impact of IT on them, students' confidence in IT use, students' IT literacy (generic competence for learning) and students' IT literacy (generic competence for solving daily problems)] at secondary school level.

2 Students' time spent on using IT for learning at school has been found to correlate positively to students' perception of positive impact of IT on them but negatively to students' IT literacy (technical knowledge and skills) at secondary school level.

3 Home ownership of computers by students is found to correlate to 5 of the six learning outcome variables [students' IT competence, students' confidence in IT use, students' IT literacy (generic competence for learning), students' IT literacy (generic competence for solving daily problems) and students' IT literacy (technical knowledge and skills)] in both Primary and Secondary School Sectors.

value and importance of ITEd. Credit should be given to all those concerned for having achieved all of this.

Policy

In the new ITEd plan, there is a need for a stronger emphasis to be placed on pedagogy rather than technology. The starting point must be the desirable curriculum goals to be achieved and the most appropriate IT-supported pedagogies for achieving these. Professional development activities should focus on how to make the best use of IT to support the pedagogy and curriculum goals, and infrastructure should be determined by what is needed to support the pedagogies. In addition, there is a need to move from “one-size-fits-all” ITEd initiatives uniform across schools to more flexible initiatives that allow school-based development according to context, stage of development and needs within a broad framework which defines and maintains a minimum standard with shared understanding of goals and objectives of ITEd.

Infrastructure

There is a need to continue financing for ongoing upgrading and maintenance of the infrastructure. The Government probably still needs to be committed to giving this support. There is also a need to make IT more accessible to general classrooms and to explore other innovative setups and arrangements in order to make it more conducive for teachers to apply IT in their teaching.

There is a need to explore ways to solicit community resources and support for ITEd initiatives, and to take full advantage of the phenomenon that most students have computers at home. In particular, there is a need to look seriously and actively at ways to facilitate more access for students to computers outside school hours, to invest resources in this respect if necessary, and to encourage teachers to plan specifically for home use of computers.

We suggest that there should continue to be some level of pro-rata distribution of funding to schools to support ITEd, but in addition to this it may also be desirable to make available different allocations for different schools. For example, there is still a need to have some positive discrimination with respect to financial support, that is to support a few seed schools that have already shown they are capable of high levels of achievement so that they can be models for others as well as some provision to enable the ‘weaker’ schools to upgrade their development.

Teacher enablement/support

There is definitely a need for ongoing professional development for teachers, not on the technical side of hardware and software use but more in terms of <u>pedagogical</u> use of IT in specific <u>subject</u> areas, as well as its use for supporting the development of students’ generic competencies in information and other higher-order cognitive skills. This can most effectively take the form of sharing of resources and best practices within and between schools according to KLAs. Models of teacher professional development in South Korea and Singapore are good examples. Technical support and curriculum support in the preparation of teaching material is still much needed. Partnerships between tertiary institutions and schools need to be more systematic and structured rather than on an ad hoc basis. Development and support involves more than the idea of everybody sharing their learning objects (e.g. through HKedCity). Teachers need some insights and experiences in terms of the whole ITEd strategy for teaching their particular subjects. There is a need to help teachers to understand the distinction between the different ways of using IT in teaching and learning: teaching with IT, learning from IT and learning the subject matter with IT.

It is also important to emphasise that the objective of ITEd is to help students to make effective use of IT as a tool in their own learning, not just to help teachers to prepare suitable materials. Hence there is a need to develop ways to help teachers to acquire the skills to promote this kind of learning.

Curriculum and pedagogy

Pedagogical use is a result of a combination of many factors, therefore, any attempt to change the pedagogical paradigm has to be seen in relationship to the whole examination system, curriculum etc. Hence the ITEd strategy should be fully integrated with the current processes of curriculum review/development. In particular there is a need to look at alternative forms of assessment that are more conducive to student-centred IT use. There is a need for greater understanding of how IT can best support various curriculum areas and for clearer guidelines for providing students with information skills as opposed to information technology skills.

Resource support

There is a need for more IT resources and materials for teaching and learning and there is little sense in this being done on a school-based level where teachers are duplicating efforts, but rather at a central level where materials are collected that can be accessed by teachers. However, it is important to note that the provision of suitable resources and materials is only one step, and it is the whole pedagogical design that is important. It is important to focus on the quality rather than the quantity of use: not whether a teacher uses or does not use IT for a particular percentage of the time, but whether they use it in a quality way that enhances student learning.

Further research and evaluation

Finally, there is a need for further research and evaluation – but it is important for this to be more focused on a particular strand of use of IT in different curriculum areas and its impact on student learning rather than general surveys. This research would most profitably take the form of coordinated school-based action research led by evaluation expert.

Chapter 1 Project Background

In 1998/99, the Hong Kong Special Administrative Region (HKSAR) Government started the Information Technology in Education (ITEd) initiatives. The visions of the ITEd initiatives as stated in the document entitled *Information Technology for Learning in a New Era: Five-Year Strategy 1998/99 to 2002/03*, (the *Five-Year Strategy*), which was issued in November 1998 after public consultation by the Education and Manpower Bureau (EMB), include the following:

(1) To turn our [Hong Kong] schools into dynamic and innovative learning institutions where students can become more motivated, inquisitive and creative;
(2) To link our students up with the vast network world of knowledge and information to enable them to acquire a broad knowledge base and a global outlook;
(3) To develop in our students capabilities to process information effectively and efficiently; and
(4) To develop in our students the attitude and capability for independent life-long learning.

In the *Education Reform Proposal* (2000, Chapter 8: Reform Proposals for the Education System), it is mentioned that one of the four key tasks in the Curriculum Reform is about the use of information technology (IT). In this key task, it is proposed that "the proper use of IT can greatly enhance the effectiveness of learning and teaching." The ultimate aim is to "enable students to learn on their own and throughout their lives." Schools were urged to "strengthen the use of IT to help teachers and students improve the effectiveness in learning and teaching."

In his Policy Address delivered to the Legislative Council in 1998, the then Secretary for Education and Manpower, Mr. W.P. Wong, mentioned that some indicators would be used to measure progress in IT in education. These are (1) percentage of students who achieve the attainment targets for their respective learning stages; (2) percentage of school curriculum delivered with assistance of IT; and (3) percentage of teachers achieving competence at various levels. Mr. Wong also indicated that the EMB would "conduct an interim review of the *Five-Year Strategy* in 2001, and a final review in 2003".

After the interim review was conducted, the Hong Kong SAR Government issued an invitation for tender for the conducting of an Overall Study on Reviewing the Progress and Evaluating the Information Technology in Education (ITEd) Projects 1998/2003 (the Overall Study) in November 2001. The Hong Kong Polytechnic University (the PolyU) was awarded the Contract in September 2002.

Based on the Project Specifications of the Tender Documents, the objectives of the current Study are:

(1) To review the progress of the ITEd projects and to recommend necessary adjustments to future implementation of ITEd projects, with specific focus on each type of school (i.e. Primary, Secondary and Special) as well as the community as a whole. The difference and diversity in each type of school will be addressed.
(2) To establish a theoretical framework to support the design of an overall evaluation (core methodology) with specific measures for each type of school (i.e. Primary, Secondary and Special) as well as the community as a whole.
(3) To develop specific evaluative model(s)/tools and conduct a pilot study to test the research methodology and instruments designed.
(4) To evaluate the application and effectiveness of ITEd in the light of the extent (i) to which schools/teachers have adopted and implemented pedagogical practices that use technology and (ii) to which the vision of promoting ITEd has been met as reflected by teachers' and students' enablement in their teaching/learning processes. The effectiveness of ITEd projects in the four

components or domains, as specified in the "Information Technology for Learning in a New Era: Five-Year Strategy 1998/99 to 2002/03" will also be addressed.

(5) To conclude the overall effectiveness (including the resources management perspective regarding manpower and budgeting; the student learning outcomes; the pedagogical and cultural impacts) of ITEd projects and to recommend strategies and plans for future investment and implementation in ITEd. Based on the information gathered and analysed, a range of options and broad directions as to where ITEd should go forward, and in which direction, will be presented.

The following gives an example of some of the EMB ITEd projects and initiatives, as mentioned in the Project Specifications. They have been included here to help to set the context of this Study. Further details of EMB ITEd initiatives will be discussed in subsequent chapters of this Report.

The ITEd projects mentioned in the Project Specifications include the following:

Access

(1) Provide hardware and equipment
  a) 15 computers for each primary school
  b) 40/82 computers to primary and secondary schools respectively
(2) Multimedia Learning Centre (MMLC) in some 100 secondary schools
(3) Information Technology Learning Centre (ITLC) in 46 prevocational schools and secondary technical schools
(4) Computer Laboratory (CL) in 27 prevocational schools
(5) Provide incentive grant to schools to open up computer facilities after normal school hours
(6) Provide 1000 computers in community facilities

Connectivity

(1) IT in Ed: Site Preparation Works
(2) Hong Kong Education City
(3) Consider the feasibility of providing Internet access and individual e-mail accounts to teachers and students above certain level

Teacher Enablement

(1) Provide 85 000 IT training places to teachers
(2) Develop self-learning packages for teachers
(3) Study on IT levels of competency and the feasibility of introducing a 'Graded Certificate' System

Curriculum

(1) Develop students' IT learning targets
(2) 25% of curriculum delivery with support of IT
(3) Full integration of IT in the new curriculum after the holistic review of CDC

Resource Support

(1) Information Technology Education Resource Centre (ITERC) and Regional Support Section (RSS)
(2) Provide 250 IT coordinators for public sector schools
(3) Provide contract technical support services to schools

Others

(1) IT plans prepared by schools
(2) Publicity (e.g. the planned IT exhibition)
(3) Disseminate good practices under the IT Pilot Scheme
(4) Summer IT Programmes for Students

Community-wide Culture

Any related issues of the above projects

The PolyU Project Team is required to cover the following scope of study:

(a) chart the progress of ITEd projects and gather information on the situation of IT provisions and applications of IT in each type of schools (i.e. primary, secondary and special) as well as in the community by early 2003/2004 school year; and compare it with the situation in November 1998 so as to review the overall progress of ITEd initiatives from 1998 to 2003 and to recommend improvement measures when implementing future ITEd projects/the IT strategy in the light of its key components:
   (i) Access and Connectivity
   (ii) Teacher Enablement
   (iii) Curriculum and Resource Support
   (iv) Community-wide Culture

(b) formulate a conceptual framework and to design the core methodology for reviewing the progress and evaluating the overall effectiveness of ITEd initiatives with specific measures for each type of schools (i.e. primary, secondary and special) as well as the community as a whole.

(c) devise the instruments such as indicators/descriptors with reference to evaluative models/tools developed for/from other IT-related studies and to produce implementation schedules for evaluating the impacts (including but not limited to operational, pedagogical and cultural aspects) of IT on each type of schools/teachers/students as well as on the community as a whole. Some of the areas of concerns are listed below:
   (i) Teachers' IT competence
   (ii) Integration of IT into the curriculum
   (iii) Usage patterns of IT facilities
   (iv) Innovative pedagogical practices
   (v) Student learning
   (vi) Changes in approach in school education and management
   (vii) Sharing of effective use of IT in teaching among schools and other learning organisations
   (viii) Community collaboration
   (ix) Cultivation of community-wide culture
   (x) Comparison with ITEd initiatives in other places

(d) select representative stratified samples of each type of schools (i.e. primary, secondary and special) as well as other community groups/organisations and to conduct:
   (i) a pilot study within 2003 in order to testify and refine (b) and (c)
   (ii) an overall study by early 2003/04 school year in accordance with (b), (c) and any other necessary refinements

(e) determine the extent to which the vision of promoting ITEd as stated in the *Information Technology for Learning in a New Era: Five-Year Strategy 1998/99 to 2002/03* document has been achieved. Details of the vision are:
   (i) to turn our schools into dynamic and innovative learning institutions where students can become more motivated, inquisitive and creative;

(ii) to link our students up with the vast network world of knowledge and information to enable them to acquire a broad knowledge base and a global outlook;
(iii) to develop in our students capabilities to process information effectively and efficiently; and
(iv) to develop in our students the attitude and capability for independent life-long learning.

(f) provide forward-looking suggestions for formulating IT policies and strategies for better education. The Contractor is required:
(i) to propose specific effectiveness evaluative models/tools for charting the progress and denoting results of ITEd projects;
(ii) to suggest ways of allocating funds and the should-be roles and responsibilities of the Government, schools and the community in order to bring our school education into the new IT world;
(iii) to suggest both short- and long-term implementation strategies with proposed plans and related ITEd projects. The strategies should cover areas including but not limited to IT provisions, curriculum development, professional and technical management of IT resources for enhancing teaching/learning processes as well as cultivation of community-wide culture; and
(iv) to address the issues arising from the management and further development of IT in school education.

According to the Contract documents, there are altogether seven deliverables. The following is a summary of the key contents as stipulated in the approved Project Plan.

(1) Detailed Project Plan [*Detailed Project Plan* as stipulated in the Tender Documents]

This is a master plan of the whole project, which will include a brief description of the following:
- Background of the project
- Conceptual framework
- Methodologies
- Deliverables
- Master implementation schedule (including the two implementation schedules for Pilot Study and Overall Study)

(2) Report on Study Instruments [*Interim Report of the Pilot Study* as stipulated in the Tender Documents]

This report covers mainly tools and instruments for use in the Pilot Study and Overall Study. Details of the report are listed as follows:
- Evaluative models/tools
- Instruments to be validated in the Pilot Study (with descriptions such as objectives, related research questions and target groups)
- Identified variables (with regard to Research Questions/Instruments)
- Raw data (non-school-based data and any school-based data as available)
- Implementation plan (with regard to work schedule and related key tasks such as sampling)

(3) Report on Pilot Study [*Final Report of the Pilot Study* as stipulated in the Tender Documents]

This report on the Pilot Study covers the following:
- Evaluative models/tools to be adopted for the Overall Study (including the sampling strategy derived from the Initial Survey)
- Complete set of raw data
- Data analyses (focusing on review of methods of data analyses)
- Summary report of Pilot Study

- Refined work plan (with regard to Instruments)

(4) Report on Conceptual Framework and Methodologies [*Report I of the Overall Study* as stipulated in the Tender Documents]

This report includes the following:
- Conceptual framework
- Research methodology for overall review and evaluation with specific measures for each type of schools as well as the community as a whole
- Refined evaluative tools/instruments
- Detailed work plan (with regard to implementation of Overall Study; in particular data collection)

(5) Preliminary Findings of the Overall Study [*Report II of the Overall Study* as stipulated in the Tender Documents]

This report covers the following:
- Raw data collected
- Methods of data analyses
- Preliminary data analyses
- Refined work plan (key event log tracking progress of related tasks)

(6) First Report of the Overall Study [*Final Report (Part I) of the Overall Study*, English and Chinese versions, as stipulated in the Tender Documents]

This First Report of the Overall Study includes the following:
- Links with the Preliminary Study [Para. 3.1 Objectives & 4.1 Scope of Study of Project Specifications]
- Teams involved
- Lists of references
- Overall conceptual framework [Para. 3.1 (b) & (c) Objectives & 4.1 (b) & (c) Scope of Study of Project Specifications]
- Research methodology [Para. 3.1 (b) & (c) Objectives & 4.1 (b) & (c) Scope of Study of Project Specifications]
- Sampling strategy [Para. 4.1 (d) Scope of Study of Project Specifications]
- Summary findings for overall review and evaluation (with initial data analyses results)
    - progress of ITEd projects [Para. 3.1 (a) Objectives & 4.1 (a) Scope of Study of Project Specifications]
    - impacts of ITEd on teaching and learning on each type of schools as well as community-wide culture with reference to areas of concerns as listed in Para. 4.1 (c) Scope of Study of Project Specifications [Para. 3.1 (d) Objectives of Project Specifications]
    - views on achievement of "visions" as stated in Para. 4.1 (e) Scope of Study of Project Specifications [Para. 3.1 (e) Objectives of Project Specifications]
    - overall effectiveness of ITEd projects with respect to stratified samples (including resources management perspective, student learning outcomes, pedagogical and cultural impacts) [Para. 3.1 (e) Objectives of Project Specifications]
- Initial Recommendations
    - improvement measures when implementing future ITEd projects/Strategy [Para. 3.1 (a) Objectives & 4.1 (a) Scope of Study of Project Specifications]
    - strategies and plans for future investment and implementation of ITEd [Para. 3.1 (e) Objectives of Project Specifications]
    - forward-looking suggestions for formulating IT policies and strategies for better education [Para. 4.1 (f) Scope of Study of Project Specifications]
    - way forward of IT in Education
- Summary of views of local and overseas consultants such as on conceptual framework, methodology and instruments

- Executive Summary (including the approach of the Study, key findings and recommendations)

(7) Final Report of the Overall Study [*Whole Final Report,* English and Chinese versions, as stipulated in the Tender Documents]

This will be an updated version of Deliverable 6, which will consist of the following:
- Links with the Preliminary Study [Para. 3.1 Objectives & 4.1 Scope of Study of Project Specifications]
- Overall conceptual framework [Para. 3.1 (b) & (c) Objectives & 4.1 (b) & (c) Scope of Study of Project Specifications]
- Evaluative models/tools [Para. 3.1 (c) Objectives & 4.1 (c) Scope of Study of Project Specifications]
- Research methodology [Para. 3.1 (b) & (c) Objectives & 4.1 (b) & (c) Scope of Study of Project Specifications]
- Sampling strategy [Para. 4.1 (d) Scope of Study of Project Specifications]
- Data collected for overall progress review and evaluation
- Data analyses
- Consolidation of the findings and recommendations of the previous reports
- Concluding recommendations
- Executive Summary (including the approach of the Study, key findings and recommendations)
- Consolidated views from each of the Local Consultant Team, the Overseas Consultant Team and the Review Team in separate chapters/appendices

The PolyU Project Team was awarded the Contract in September 2002 and the progress of the Study since that date is summarized as follows:

The Project Team received the notification of the offer of this Project from the then Education Department (ED), now EMB of The HKSAR Government on 18 September 2002. Shortly after the commencement of the Project, the Project Team conducted an Initial Survey in November 2002 for collecting information on IT progress in each school for subsequent stratification in the Overall Study. The School Information Technology (IT) Form was used for this purpose. The Initial Survey Report was submitted to EMB on 28 February 2003.

The 1st deliverable of the Project was a detailed Project Plan. The first draft was submitted on 30 September 2002 and the final version was approved formally by EMB on 16 May 2003.

After the conducting of the Initial Survey, and subsequent to the approval of the Project Plan by EMB on 16 May 2003, a Pilot Study was conducted between 30 May and 2 July 2003. The purpose of the Pilot Study was to test the research methodology and instruments designed, as well as to rehearse the logistics and to trial the instruments to uncover any possible areas for improvement. An Interim Report of the Pilot Study, which is the 2nd deliverable of the Project, was submitted to EMB on 30 May 2003. The "Final Report of the Pilot Study" (2nd and 3rd deliverables) was submitted to EMB on 11 November 2003.

Subsequent to the approval of the Final Report of the Pilot Study, the Project Team refined some aspects of the research methodology and instruments, and submitted the "Report I of the Overall Study: Conceptual Framework and Methodologies" (the 4th deliverable) to EMB on 25 November 2003. The revised "Report I of the Overall Study: Conceptual Framework and Methodologies" was submitted on 9 February 2004.

Concurrently, the fieldwork of the Main Study took place from 3 November 2003 to 7 May 2004. The full-scale Study aimed to gather data and to perform analyses to address all issues and requirements as stipulated in the Project Specifications in the Tender Documents. "Report II of the Overall Study: Preliminary Findings of the Overall Study", which is the 5th deliverable of the Project, was submitted to EMB on 30 April 2004.

The present document is the “Draft Whole Final Report” (7th deliverable).

Implementation Schedule for Overall Study

The major events for the Overall Study are shown in Table 1.1

Table 1.1: Implementation Schedule of the Overall Study

Events	Period/Date
Awarded the Contract	September 2002
Data Collection of Initial Survey for Stratification	November 2002 to January 2003
Submission of Initial Survey Report	28 February 2003
Meetings with Local Consultants	April 2003
Approval of the Project Plan	16 May 2003
Data collection for the Pilot Study	30 May 2003 to 2 July 2003
Submission of Report of the Pilot Study	11 November, 2003
Refinements of Methodology and Instruments for Main Study	June 2003 to October 2003
Meetings with Overseas Consultants	September to October 2003
Recruitment and training of fieldwork staff members for the Main Study	September to October 2003
Preparations for the Main Study	September to October 2003
Data collection for the Main Study (including follow up of non-responses)	3 November 2003 to 7 May 2004
Submission of Report I of the Overall Study: Conceptual Framework and Methodologies (Version 1)	25 November 2003
Data analysis for the Overall Study	December 2003 to June 2004
Submission of Draft of the Report II of the Overall Study: Preliminary Findings of the Overall Study	30 April 2004
Meetings with Overseas Consultants, Local Consultants, and Review Panelists	May to July 2004
Submission of Draft of the “First Report of the Overall Study [Final Report (Part I) of the Overall Study]	30 June 2004
Submission of First Report of the Overall Study [Final Report (Part I) of the Overall Study]	13 August 2004
Submission of Draft Whole Final Report	30 October 2004
Submission of Whole Final Report	30 November 2004

Chapter 2 Literature Review

2.1 Introduction

The HKSAR Government is not alone in promoting the use of information and communication technology (ICT, used interchangeably with IT throughout this report) in education. Educators and policy-makers worldwide have become increasingly intrigued by the rapid development of information and communication technologies, and their possibilities for teaching and learning (Plomp, 2000). In many countries (e.g., Denmark, USA, UK and Singapore, to name just a few), action plans have been launched to improve the ICT infrastructure and encourage teachers to make more widespread and appropriate use of ICT in facilitating teaching and learning (Pelgrum and Anderson, 2001).

The purpose of this chapter is to give an overview of recent literature that relates to the objectives of this Study outlined in Chapter 1. This review of literature has been used as a basis for the development of the Conceptual Framework (Chapter 3) and design of methodologies and instrumentation (Chapter 4) for this Study.

The sections below attempt to provide a brief review of the literature in terms of:

- Pedagogical application of IT,
- The rationale and potential benefits of applying ICT to teaching and learning,
- The impact of ICT on students' learning,
- The impact of ICT on teachers' beliefs and practices,
- The contextual factors mediating the application of ICT to teaching and learning.

There has been a huge amount of research on the effectiveness of educational technology, so a comprehensive review of the literature is beyond the scope of this chapter. While many studies show that the use of ICT in education can have a positive impact on teaching and learning, the results are far from conclusive for the more pedagogically complex uses of the technology and for promoting students' higher-order thinking skills.

2.2 Pedagogical application of IT

The literature of the past decade describes several ways in which information technology is used in schools. The first of these is *learning about* IT (Cuttance & Stokes, 2000). This is concerned with the acquisition of basic technological knowledge and skills about IT. The next is *teaching with* IT (Barnett, 2003a), which is the use of IT as a means of presenting information, for example PowerPoint presentations, perhaps using animation and sound effects to add a novel way to attract the students' attention. This method has its place if used in instruction when it is appropriate, and not as the sole tool. The next type of IT use in teaching and learning is *learning from* IT (Barnett, 2003a, Ringstaff & Kelly, 2002), which involves the computer as a tutor, such as in the use of drill and practice or integrated computer-based learning software. Another way is *learning with* IT, which involves using technology to access resources through searching for information on the Internet, communication, using simulations, using graphical calculators to teach calculus, etc. (Cuttance & Stokes, 2000). Learning with IT involves IT in mediating learning, that is using computers and other technologies as tools to carry out tasks such as writing, analyzing data, solving problems and doing research (Barnett, 2003a, Cuttance & Stokes, 2000, Ringstaff & Kelly, 2002). This kind of use of IT is often considered as being closely aligned to the constructivist philosophy of learning (Ringstaff & Kelly, 2002). In this type of use, it is the teachers and students, not the computers, who are controlling the curriculum and instruction (Ringstaff & Kelly, 2002). It has been suggested quite clearly in the literature that good IT pedagogy is not about using just one of these methods to the exclusion of the others, but rather about achieving a balance of appropriate use based on the objectives of the lesson (Barnett, 2003a). It is also clear from the literature that good pedagogy with IT is about using it as a tool when it is the most appropriate one to facilitate the learning objective (Ringstaff & Kelly, 2002; Yong et al., 2002). Examples of cases when the computer is the most effective tool include experiments and demonstrations that are otherwise too dangerous, expensive or impractical, analysis and presentation of research results or accessibility to information for disabled students or students at locations distant from learning materials and instructors (Burg & Cleland, 2001).

There is, however, evidence of a rough progression of stages through which schools typically develop their ICT pedagogy which reflects these different ways of using it (Barron et al., 2003; Cuttance & Stokes, 2000): initially learning for themselves and teaching students about the basics of IT, then using it to support traditional instruction, followed by seeking to integrate it across the curriculum as a means of providing learning environments that allow students to learn from IT, and full integration when learning takes place through IT.

2.3 Rationale and potential benefits of ITEd

Educators believe that appropriate use of ICT in education can have a powerful impact on student learning. Dwyer (1994) argues that ICT provides “an array of tools for acquiring information, and for thinking and expression” and that the learning experiences “will enable students to live productive lives in the global, digital, information-based future they all face.” Likewise, Peck and Dorricott (1994) comment that to function effectively in the digital era, “students must feel comfortable with the tools of the Information Age.” It is therefore imperative that students are provided with wider exposure to the use of ICT in their learning process. Alvari (1994) also points out that students “need to learn at a higher rate of effectiveness and efficiency than ever before because of the rapidly growing bodies of relevant information and the escalation of knowledge and skill requirements for most jobs”, which can be achieved by a more widespread use of ICT in the teaching and learning process.

The potential benefits of technology in education have been summarised succinctly by the CEO Forum on Education and Technology (CEO Forum, 2001) into three broad categories as indicated below:

<u>Improve Student Achievement</u>

- Improved scores on standardised tests
- Increased application and production of knowledge for the real world
- Increased ability for students to manage learning
- Increased ability to promote achievement for special needs students
- Improved access to information increases knowledge, inquiry and depth of investigation

<u>Develop 21st Century Skills</u>

- Improved basic skills (e.g., mathematics and writing)
- Improved digital age literacy skills
- Improved inventive thinking skills
- Improved effective communication and interpersonal skills
- Improved productivity skills

<u>Promote Student Achievement by Improving Effectiveness for Educators, Administrators, Parents and Community</u>

- Improved ability to meet student education outcomes
- Improved professionalism
- Improved instructional practice
- Increased communication and collaboration (with outside experts, peers, students, community members and parents)
- Improved efficiency and more constructive time spent on administrative tasks

This provides a useful framework not only for planning and implementing ICT initiatives but also for evaluating the impact and effectiveness of such endeavours.

Table 2.1 summarises the indicators that have been used by several countries for evaluating the progress and achievement in ITEd. Emphasis has been placed here not on indicators of the extent to which students have learned IT skills *per se* but on the goals that have been set and/or strategies that have been used to measure the effectiveness of IT as a tool to facilitate the development of higher-order thinking and other desirable generic impacts on learning.

Table 2.1: Examples of goals and indicators of ITEd adopted by some overseas countries

Country/Area	Source of information	Main Ideas
Singapore	Lim (2002)	Singapore Masterplan for ICT in Education launched in April 1997: one of goals – creative thinking, ability to learn independently and continuously and effective communication
	Ping et al. (2001)	Used questionnaire (school IT culture, pupil use, teacher use, management of IT resources and staff development) and case studies to examine and analyse where and how IT is integrated in Singapore schools to develop pupils' higher order thinking skills (as of May 2004 the case study results have not appeared on the report website)
UK	Stokes, E. & West, A. (2003).	Key stage 1 – should be taught in core subjects of English, mathematics, science. Key Stages 2 to 4 – statutory requirements to use in all subject areas except Physical Education. No requirement to teach ICT as stand-alone subject
Australia	UNESCO website (downloaded 5/4/2004)	All students will leave school as confident, creative and productive users of new technologies, particularly information and communications technologies, and understand the impact of those technologies in society. All schools will seek to integrate ICT into their operations to improve student learning, to offer flexible learning opportunities and to improve the efficiency of their business applications Components of indicators (http://www.edna.edu.au): increase in student engagement, enthusiasm and motivation, if student-centred learning took place, improvement in students' higher-order thinking skills, occurrence of changes in teaching practices, improvement in ability to use emerging technologies
Europe	UNESCO website (downloaded 5/4/2004)	Inclusion of ICT in the curriculum Percentage of teachers using computers and/or internet in classroom Objectives defined in curriculum for teaching or use of ICT Percentage of teaching time related to ICT Desirable ICT skills
USA	UNESCO website (downloaded 5/4/2004)	One example cited of a school in Washington using assessment tools such as: assessment rubric designed for specific projects, lessons and/or classroom experiences; standard assessment tools; teacher anecdotal notes, parents' reports of student learning process

2.4 Impact of ICT on students

The presence of computers has been shown to make an impact on the learning environment (Newhouse, 1999) and there has been some evidence reported that IT use has had greater impact on students when teachers have had easy, consistent and frequent access to it in the classroom rather than in the computer laboratory (Barnett, 2001; Barnett, 2003a; Becker, 2001; Ringstaff & Kelly, 2002; Yong et al., 2002). It is of interest to note that in nearly all the cases reported in the SITES-M2 study (Kozma, 2003) the students acquired ICT skills during the process of using the ICT as a tool to facilitate learning in curriculum areas rather than in isolated IT classes.

Research in the USA (reported by Barnett, 2003a) found that students who had learned from computers, that is computers used as tutors, showed consistently higher academic achievement gains, particularly in subject-related skills areas (Ringstaff & Kelly, 2002) and some evidence that even learning from computers may lead to more use of higher-order thinking skills than students who did not use computers as tutors to receive information. There has been evidence that IT use can reduce the time required for students to learn basic skills (Ringstaff & Kelly, 2002). Furthermore, there have been some reports of use of computers as tutors having positive effects on affective factors such as discipline (Barnett, 2003a, Ringstaff & Kelly, 2002), ability to collaborate with peers to develop projects and reports, initiative, time spent on task (Barnett, 2003a), increased motivation and improved self concept (Ringstaff & Kelly, 2002). On the other hand, it has been found that if teachers use technology exclusively rather than as one tool in their repertoires, students are likely to become bored (Ringstaff & Kelly, 2002). It has also been claimed that the likelihood of successful implementation is reduced if IT is regarded just as a means of adding novelty to teaching (Yong et al., 2002). In fact, it has been suggested that there can be a danger in the notion that animation, bright colours and random noises are making good use of IT in instruction when, even though they are entertaining, these can give students the impression that work and discipline are not needed for learning (Burg & Cleland, 2001).

In a meta-analysis of more than 500 studies of computer-based instruction, Kulik (1994) found that students using computer-based instruction tended to learn more in less time, perform better in standardised achievement tests, like their classes more and develop more positive attitudes towards computers. In a more recent review of 219 research studies from 1990 to 1997 on the effectiveness of technology in education (Sivin-Kachala, 1998), it was found that positive effects on achievement were experienced by students in technology rich environments in all subjects in preschool through higher education, for both regular and special needs children. Consistent improvements were also found in students' motivation, confidence with using computers, and attitudes towards learning and their own self concepts. Similar findings were obtained from a number of large scale evaluation projects (e.g., Baker et al., 1994; Becta, 2001; Scardamalia and Bereiter, 1996). However, it should be noted that most of the studies reviewed involved software programmes of a rudimentary nature emphasising drill and practice, and a majority of them focused on students' performance on lower order tasks and basic skills as measured by standardised academic tests (McKenzie, 1995). Few examined the impact of ICT on students' higher-order cognitive processes such as information skills, problem-solving skills, analytical or critical thinking skills. Furthermore, as Kulik's meta-analysis has shown, computers had positive effects only in some areas in which they were studied.

2.5 The impact of ICT on teachers' beliefs and practices

There is mixed evidence about the impact of ICT on teachers' beliefs and practices. Yong et al. (2002) found that teachers basically use technology in ways that are consistent with their pedagogical beliefs. However, despite there being very clear evidence that technology alone, without the interactive effects of other factors, is unlikely to bring about shifts in teaching paradigms (Ringstaff & Kelly, 2002), many studies have reported teachers claiming that using technology encourages them to be more student-centred and more willing to experiment in their teaching (Knapp & Glenn, 1996). Clearly for IT to have any real impact on teachers' beliefs and practices, it is necessary for them to learn new instructional strategies and new roles beyond learning just technology skills (Barnett, 2003a).

An evaluation of the 10-year Apple Classroom for Tomorrow (ACOT) project revealed that as teachers became more comfortable with technology they tended to report that they enjoyed their work more, felt more successful with their students, interacted with their students more as guides or mentors, and changed their teaching practices toward more cooperative group work and less teacher stand-up lecturing (Apple Computer, Inc., 1995). More importantly, it showed that teachers go through predictable stages in their use of technology (from Entry to Adoption to Adaptation and, finally, to Appropriation) and that this may take three to five years (Dwyers et al., 1990; Newhouse, 1999). However, studies of impact of ICT on teachers are relatively scanty. Coley (1997) urges that researchers and evaluators should pay more attention to the effects of technology on teachers and the way they teach.

2.6 The contextual factors mediating the application of ICT to teaching and learning

The most important lesson learned from the review is that the benefits of ICT do not happen automatically just because the technology has been provided (Wellburn, 1996). There has been strong evidence (e.g., Bodilly and Mitchell, 1997; Glenna and Melmed, 2000; Law et al., 2000; Sivin-Kachala, 1998) to suggest that the level of success in applying ICT to education is mediated by a complex interplay of key contextual variables, including:

- The technology infrastructure and students' access to the technology,
- Students' beliefs, attitudes, and skill,
- Teachers' beliefs, attitudes, and skill,
- Teacher enablement and continuing development,
- Pedagogical application of the technology,
- School tradition, vision, leadership and culture,
- Support from administration, community, and government.

In the following section, recent research findings in relation to the impact of these variables on the application of ICT to education will be discussed.

<u>The technology infrastructure and students' access to the technology</u>

Increased technological infrastructure is a major concern of ICT policies globally, being listed by UNESCO (2002) and the OECD (Venezky and Davis, 2002) as one of the key performance indicators for ICT use in education. Participating countries reported the importance placed on developing a dependable, flexible, sage, multi-purpose, multi-functional, pervasive infrastructure to a majority of schools.

Despite the importance placed on the acquisition of state-of-the-art technology infrastructure, the literature points clearly to the fact that successful implementation of IT in schools is not just a matter of "buy them, install them and sit back to enjoy the difference they make" (Barnett, 2003a, p.4) but of making a committed, sustained effort over a long period of time. In fact, it has been suggested that access to equipment and software alone seldom leads to widespread use by teachers and students and that access without appropriate teacher enablement was more likely to lead to sustained rather than changed patterns of teaching practice (Cuban et al., 2001). Location of computers in the classroom rather than in a laboratory has also been reported to have a positive effect on teachers' competence and confidence to use the tools (Ringstaff & Kelly, 2002).

Ba et al. (2002) describe the phenomenon of 'digital divide' which refers to inequities of access to technology based on income, education, race and ethnicity. They report that the emergence of children's IT literacy skills are linked to access issues including length of time there has been a computer at home, the family's ability to purchase stable Internet connectivity, numbers of computers at home, parents' skills with computers and technical expertise of friends, relatives and neighbours. In Hong Kong, there has been some evidence reported of a gender difference in access to computers, in favour of boys (HKIEd, 1999a).

<u>Students' beliefs, attitudes and skill</u>

There have been a number of reasons cited in the literature as to why the assessment of IT skills, on an international basis, has not been done in any systematic or consistent way. These reasons include that the relevance of skills and knowledge is constantly changing due to the high level of technology change and the focus in many countries to date on the use of self-report measures of IT skills (Cuttance & Stokes, 2000).

Nevertheless, it seems that most of the Hong Kong and overseas studies reviewed have reported that students have generally attained reasonable levels of competency with IT skills. Some studies have noted that students are competent with knowledge and skills in the use of applications such as spreadsheets, databases and word processing at secondary school level (HKIEd, 1999a; Newhouse, 1999) although there has been less consistent evidence of primary school children being experienced with applications other than word processing and some searching for information on the Internet (HKIEd, 1999a). There has been some evidence of female students being more likely to report high levels of incompetence (HKIEd, 1999a). The ability level of the students can also influence the types of computer applications used, with teachers of low-ability classes tending to use games for practising skills and applications such as word processing being used differentially according to ability level (Becker, 2001).

In Hong Kong, the CITE study (2001) indicated no evidence of marked differences in students' attitudes towards computer use since the commencement of the ***Five-Year Strategy*** in 1998. Students of both primary and secondary schools in Hong Kong have expressed the belief that those who use IT can do better at school and be more effective learners (HKIEd, 1999a), although there is no reported evidence of this affecting their computer use. Studies of student attitudes have indicated that students who have had access to computers have indicated better attitudes than non-computer users to subjects such as science, feeling that the use of spreadsheets and graphing 'brought it alive' and that even word processing led to favourable attitudes towards report writing (Fisher and Stolarchuk, 1998). On the other hand, students have expressed the attitude that something important to their learning is missing if they have only virtual learning spaces with no face-to-face interaction (Dede et al., 2002). It has also been reported that students preferred to be given a choice rather than being 'forced' to use computers and that where negative attitudes existed this appeared to be the result of perceived lack of use of computers in class and opinions that students needed more computer training from school (Newhouse, 1999).

Teachers' beliefs, attitudes and skill

Globally, the lack of ICT-related knowledge among teachers has been seen as a major obstacle to realizing ICT-related objectives of schools (Pelgrum and Anderson, 2001). The constant development of IT makes competency development continuous and demanding (Spector and de la Teja, 2001).

In Hong Kong a study by HKIEd (1998) found that 76% of primary teachers and 69% secondary teachers reported lack of ability to solve technical problems. The same study also revealed gender differences in teachers' self-ratings of their competence, and that principals generally had low perceptions of teachers' competency – however there was some optimism reported, with teachers predicting that they could become prepared to use IT effectively after 1-2 more years of training. Teacher attitudes have a considerable role to play in contributing to the effectiveness of implementation of IT. Generally teachers feel confident about basic skills (CITE, 2001) but less so about more advanced applications. For example, self-efficacy with respect to computers (that is confidence with specific aspects of computer use) was found to be an important factor in decisions about using them (Albion, 1999). In fact, Albion reported a general lack of confidence for teaching with computers. Teachers have expressed, during professional development sessions, such reserved attitudes as, 'Can I handle this?', 'Will it make my job easier?' and, 'Will I be replaced by a computer?', suggesting the importance of critical factors such as ongoing sympathetic technical support and mentoring by trusted peers (Sherry and Gibson, 2002).

Teacher enablement and continuing development

While teachers' technology proficiency is one factor that plays a major role in classroom technology innovations (Yong et al., 2002), teacher training has been reported as a significant influencing factor, with those teachers who feel they are well prepared to integrate the use of technology into their teaching using it more frequently and in a greater variety of ways conducive to positive student outcomes (Becker, 2001; Ringstaff & Kelly, 2002). Another factor that has positive impacts on student outcomes is the integration of IT with the curriculum and with ongoing classroom work rather than as a separate activity (Barnett, 2003a). Furthermore, it has been found that impacts are potentially greatest when the IT is just one component of a wider initiative to improve student learning (Barnett, 2003a; Ringstaff & Kelly, 2002; Yong et al., 2002).

Teacher professional development and enablement has been reported as a major IT in education goal (*Five-Year Strategy*, NSSE, 1996; Moursund, 1997; OECD, 2002; UNESCO, 2002). The HKIEd study (1999a) recommended the period covered by the study as an 'opportune time for teachers to consider the way they teach and make attempts to implement new teaching strategies to integrate IT in classroom teaching' (p.9) and there is certainly evidence that ongoing training can affect the way in which the use of technology can impact upon student learning (Barnett, 2001). However, the Preliminary Study (CITE, 2001) identified differences in the quantity of computer use between pilot and other schools but little evidence of differences in teaching methods or attitudes, thus suggesting that a paradigm shift had not occurred and hence implying the need for further professional development. The HKIEd (1999) and NCREL (2003) reports both suggested that the lack of effective use of IT in teaching and learning could be attributed largely to lack of teacher training. The teachers themselves were interested to receive professional development in effective use of the applications rather than in how to use them to enhance their teaching, hence the recommendation was made that teachers should be given opportunities to visit pilot schools to see good practices being modeled. Now, however, as a result of the courses provided in Hong Kong for teachers since the introduction of the *Five-Year Strategy*, all teachers are expected to have reached a 'basic' level of IT competency and 75% are expected to have reached 'intermediate' level (Pearson, 2002).

Some suggestions have been proposed as to the essential components of professional development for teacher enablement. These should include: a connection to student learning, hands-on technology use, variety of learning experiences, curriculum-specific applications, collegial learning, active participation and sufficient time, technical assistance and support (NCREL 2003). Research has shown clearly that the most effective professional development means for helping teachers to integrate technology effectively into their classrooms are exploring, reflecting, collaborating with peers, working on authentic learning tasks and observation of other teachers who are using it well under the same conditions as their own (Ringstaff & Kelly, 2002). Barnett (2003b) has provided a useful list of strategies that are effective in encouraging teachers to make good use of IT, including getting input from stakeholders, helping principals to be champions of professional development, grouping teachers by grade level or subject, providing time for hands-on activities, focusing content on curriculum rather than software, modelling classroom examples, and being flexible and listening to teachers' needs. He lists unsuccessful strategies that include top down decisions without teacher input, no involvement from principals, one-off workshops with no follow-up and 'show and tell' sessions. Jacobsen (2001) advocates the use of classroom-based professional development, indicating that this can have positive effects on teachers' enthusiasm and confidence to explore ways to integrate technology and increase student engagement in their learning in subsequent years.

<u>Pedagogical application of the technology</u>

The international SITES-M1 study (Pelgrum and Anderson, 2001) did not find strong support for the hypothesis that long-term use of ICT would facilitate the emergence of change in pedagogical practices at classroom level, and in fact Hong Kong scored amongst the lower groups in ratings on indicators of emerging practices. However, many specific examples of innovative pedagogical practices have been reported in recent international literature. Some examples of these include:

- Addressing real-world problems, e.g. testing the water supply and demonstrating links between incidence of tooth decay and fluoride in water (United States Department of Commerce, Part 3: Kids contributing to their communities, 1999)
- Videoconferencing to discuss projects between schools in distant places (United States Department of Commerce, Part 3: Kids contributing to their communities, 1999)
- Study of nutrition in the school cafeteria; setting up a community job fair; developing skills needed for the world of work (United States Department of Commerce, Part 4: Getting ready for

the world of work)
- Students establishing a technology access center for the community (United States Department of Commerce, Part 5: Helping children bridge the digital divide)

Evidence has been reported of a link between frequency of computer use and pedagogy, with computers being used most often in classes where the teachers tried to adopt constructivist or other student-centred learning approaches rather than using IT for information gathering or teaching skills (Becker, 2001; Newhouse, 1999). According to the Preliminary Study (CITE, 2001) teachers saw their main role in IT use as being to enhance academic knowledge and interest in learning rather than to facilitate creativity, confidence, communication, expression etc. and the most common practices involved using ICT as an expository tool for the teacher (also reported in CITE, 2001). The study further reported that teachers saw the main obstacles to using IT for innovative purposes as being lack of suitable software (also HKIEd, 1998; 1999a), lack of teachers' competence to use IT in teaching and learning, and lack of adaptability of the curriculum – teachers do not like to feel that they are being forced to change the curriculum to suit computers (Barnett, 2001; Newhouse, 1999). Similar disappointing results were reported in the HKIEd (1998) study, that only 3% of teachers were using IT actively in teaching and learning, but the Preliminary Study (CITE, 2001) reported that there was a noted difference between the pilot and non-pilot schools in understanding of how to integrate IT into teaching and learning.

As far as curriculum integration is concerned, it was alarming that 85% of the principals surveyed in the HKIEd (1998) study said that the existing curriculum did not have room for IT – even though 71% said its use should be integrated into all curriculum areas. Often IT use that is purported to be curriculum-focused is in fact little more than skill-oriented (Becta, 2001; Newhouse, 1999) and the nature of the curriculum area can have an effect, for example those subjects that are suited to the use of word processing are more likely to have more utilization of computers (Newhouse, 1999).

<u>School tradition, vision, leadership and culture</u>

School leadership has been identified as the single most important factor affecting the successful integration of IT into education (Barnett, 2003a). Further, it has been found that the closer the IT use is to the dominant set of values, pedagogical beliefs and practices of the overall school culture, the greater is the likelihood of successful implementation (Yong et al., 2002).

Barnett (2001) categorized six barriers to implementation with which teachers are faced: leadership, access, time (also Sherry and Gibson, 2002), cost, training and reform – all of which are linked in some way to school tradition, vision, leadership and IT culture. Jacobsen (2001) and Law et al. (2000) make a compelling claim for visionary and knowledgeable school leadership that also involves teachers in decision making and planning to facilitate the effective integration of IT for teaching and learning. This can function as strategic planning and goal setting; budgeting and spending; organization; curriculum; evaluation; external relations and leadership at school level, especially whether the school has established technology policy goals and specific implementation plans, all of which can have an impact on pedagogical improvements (Anderson and Dexter, 2000).

<u>Support from administration, community, and government</u>

The school community and the general community have important roles to play in ITEd, since if some use IT and others do not, it can lead to weaknesses in the functioning of society (Sherry and Gibson, 2002). The community-wide culture comprises school heads, teachers, students, parents, tertiary institutions the business community and community bodies (EMB, 1998). It was encouraging to see that the Preliminary Study (CITE, 2001) indicated that 70% of teachers reported positive sharing cultures with colleagues from their own and other schools, parents and external organizations.

Of particular importance are the elements of the home and social environment that shape the quality of children's computer use: parents' own experience and skills with computers; children's leisure time at home; computing habits of their peers outside of school; and technical expertise of friends, relatives and neighbours (Ba et al., 2002). In fact, Ba et al. reported that for low-income families, recreational time spent on the computer was spent as quality family time, hence adding another important dimension to the home computer link. Access to a computer at home and the quantity and nature of the time spent on the home computer are more important to student learning outcomes than other factors (Becta, 2001). The positive impact of home computer use can benefit parents as well as children, as indicated by the findings of the United States Department of Commerce (Part Five: Helping children bridge the digital divide, 1997) that some parents, after participating in a laptop loan scheme with their children, reported improved job situations as a result of the computer training they received through the project.

As Coley (1997) has pointed out, "the 'social contexts' of how technology is used are crucial to understanding how it might influence teaching and learning. Educational technologies cannot be effective by themselves. The social contexts are all-important." The implication is that for a systematic evaluation of any ICT initiative, it is imperative that we focus not only on the input and output variables. Much more attention should be paid to the intervening variables in the teaching and learning process that mediate the impact of ICT on student learning. As Kozma (1994) has argued, the most meaningful question to ask in an evaluation is not whether the technology or media have any impact on learning, but when and under what conditions they will influence learning.

2.7 Hong Kong Studies

The studies that have been conducted in Hong Kong into various aspects of IT use in schools are numerous and it is beyond the scope of this Study to review all of them here. A selection has been listed in Appendix I and interested readers are advised to refer to them for details. This section will focus on the three inter-related large-scale studies carried out by the Centre for Information Technology in School and Teacher Education (CITE) at the University of Hong Kong to investigate the application of IT in education in Hong Kong, which may provide some useful baseline data for comparison of the results of this study.

2.7.1 The SITES-M1 study

The first was the Hong Kong study of the *Second International Information Technology in Education Study, Module 1* (SITES-M1) conducted in November 1998, which aimed to collect information on the application of IT in local school education for international comparison through questionnaire surveys of school principals, technology coordinators, teachers and students in primary and secondary schools. Data were collected on IT-related curriculum goals and IT implementation, the availability of hardware, software and network facilities in schools, staff development, the organisation of IT coordination in schools and difficulties encountered, teachers' and students' use of IT in teaching and learning both in school and at home, as well as their self-evaluation of their own IT competence (Law et al., 1999). While not part of the formal evaluation plan of the ITEd initiatives in Hong Kong, the study incidentally provided *some* baseline data on the application of IT in education with which the progress of the ITEd initiatives over the five-year period 1998/99 to 2002/03 could be charted. The main findings of the Hong Kong component of the SITES-M1 study are summarised below, in conjunction with a general overview of the findings from the 26 countries surveyed.

Access and Connectivity

The rate of home ownership of computers in Hong Kong was 34%. This was comparable with other countries like Japan, Singapore and the United States.

Curriculum and Pedagogy

The report refers to an 'emerging paradigm' which is 'grounded in the growing need for information in the society at large and for life-long learning in particular' (p.224). Many of the countries surveyed had formally adopted ‘Information Society’ goals for educational planning and about half of them had life-long learning as a goal.

- The surveys found evidence of emerging pedagogical practices in all of the participating countries except Hong Kong and Japan. These emerging practices were described as satisfying by school principals. However, in reality, these new practices had not permeated the curriculum. There were isolated cases reported in many countries of teachers integrating IT effectively into the curriculum but only a few countries where this kind of use was widespread.
- The highest expectations with regard to ICT skills of students were observed in Canada, New Zealand and Singapore, with the lowest figures obtained from Hong Kong, Iceland, Japan, Norway and Slovenia. However, Hong Kong had one of the highest percentages of students capable at electronic communication skills.
- A large percentage of schools surveyed indicated that they had access to the Internet and that their students used email and the World Wide Web in their studies. Less than 50% of Hong Kong schools were using the World Wide Web for instructional purposes.
- Schools reported an emphasis on self-responsibility for learning and project-based learning to help to prepare students as life-long learners.

Infrastructure

- Nearly all of the participating countries had national initiatives to equip all K-12 schools with ICT, including adequate hardware and software. Hong Kong planned to provide about 65 000 computers for primary and secondary schools. Iceland and Singapore were particularly strong in establishing Internet connections in every school and had relatively low ratios of students to computer. More than half of the countries had developed national Intranets for education purposes. Hong Kong was one of the countries with fewest primary schools connected to an internal network (less than 20%), but a bit higher up in the rankings for secondary schools (about 30%).
- Comparisons to earlier data indicated that computer density had been doubling every three to five years. Hong Kong was among the countries with less favourable student-to-computer ratios (30 or more).
- An increasing amount of multimedia-ready equipment was reported. Hong Kong and Singapore were the leaders in the provision of this kind of infrastructure. Hong Kong was also one of the most advanced countries in terms of availability of computers with high-speed processors and recent operating systems.

Staff Development

- Almost all participating countries had national initiatives for promoting the development of teachers’ ICT skills, with some of these being mandatory. Generally it was found that teachers were willing to take basic IT courses even where they were not mandatory, but that they were not so interested to engage in continuing staff development. However, only about one-fifth of the principals surveyed felt that they had realised their goals.
- There was relatively little evidence of countries providing professional development that enabled teachers to prepare to integrate IT into their daily instruction. It was suggested that policy makers may not have been aware of the importance of this kind of support. Even school technology experts reported that, while their technical knowledge and skills were adequate, their pedagogical knowledge of how to use IT effectively was not. Hong Kong was one of the countries with relatively high availability of external courses at primary school level but did not stand out in either the highest or lowest extreme groups for any other aspects of staff development.

Management and Organisation

- Management and organisation were generally left up to local school leadership. Some ministries of education had established curricula for their schools and developed instructional materials.
- The majority of school principals reported that their schools had goals for a common vision on the use of computers, but several said that these goals were not being realised. Hong Kong was one of the countries in which less than 50% of the schools surveyed had written IT policies.
- The principals tended to have favourable attitudes to IT but this was not reflected in their actions.
- Safe and ethical management of the Internet was considered to be an emerging issue of importance for schools, particularly with respect to establishing and defining acceptable boundaries and the consequences of crossing these boundaries.
- The results indicated that it may be easier for schools to implement managerial applications of IT than instructional ones.

2.7.2 Case studies of ICT use in Hong Kong schools

In conjunction with the Hong Kong SITES-M1 study, a series of case studies (including seven primary schools, eleven secondary schools and one special school) was conducted by CITE in 1999-2000 to identify and examine cases of good practices in the use of IT in Hong Kong schools at the classroom level, and construct analytic models of such practices (Law, et al., 2000). Law's et al. (2000) study of good practices in Hong Kong schools, undertaken as a part of the SITES study, made the following key observations and recommendations:

- There was generally a heavy emphasis on information processing and production activities. At primary school level, Hong Kong schools showed a higher level than the international pattern in focus on basic IT skills and use of IT for remediation.
- While there was little evidence of changes in teachers' teaching practices, there was considerable evidence of changes in teachers' perceptions of their roles as changing from transmission to facilitation. There was less increase in collaboration amongst teachers in Hong Kong than was shown in the overall international data.
- Principals reported gains in students' knowledge and skills, followed by concentration, interest and motivation. These were all reported more frequently in Hong Kong than internationally. There were no negative impacts on students reported by principals.
- The majority of lessons observed at both primary and secondary levels followed the expository approach, followed by task-based approach, then inductive approach. IT was used primarily as part of the stimulus to enhance teacher-student interaction, in environments that were mostly teacher-directed. Only two lessons, at secondary level, were based on each of problem-based and social-constructivist approaches.
- Teachers indicated that the successful implementation of IT in their classes was challenging for the majority. One of the major factors contributing to this was lack of confidence and another was lack of pedagogical competence.
- Students' and teachers' feedback suggested that the use of IT did help to arouse students' interest to some extent. However, the importance of varying methods of presentation was emphasized in order to prevent the novelty effect of IT use wearing off.
- Some pitfalls were identified in the use of computer presentations. One of these was the tendency for the teacher to follow the prepared materials closely, thus reducing the opportunities to respond spontaneously to the students' reactions. There may be a danger in using IT to convey large amounts of information without giving the students time to reflect on and digest this information. While animations can help students to visualise concepts more clearly, there is a danger that the students' construction of meaning may be reduced to a simple viewing of computer animations.
- In the cases where an inductive approach was used in conjunction with IT there was evidence of development in students' cognitive skills and processes. The teachers reported that this approach enabled them to explore topics in greater depth than covered by the textbook.
- Students reported a preference for sharing computers for collaborative work, partly for social

reasons and partly for the purpose of sharing the work.

2.7.3 The Preliminary Study

The Preliminary Study on Reviewing the Progress and Evaluating the Information Technology in Education (ITEd) Projects (CITE, 2001) was the first extensive study of reviewing the ITEd development covering a group of primary, secondary and special schools in Hong Kong. In the report, there were 13 major findings for the review period from 1998/99 to the 2000/01 school year. Directly or indirectly, they are related to the four different areas of ITEd initiatives and projects specified by the Education Department (ED, now merged with the Education and Manpower Bureau, EMB) of the HKSAR Government. One finding was that there had been a great improvement in the hardware, software and network infrastructure provisions due to the "Access and Connectivity" policy from ED. IT skill levels of students and teachers had been increasing steadily due to the various initiatives. However, there were still obstacles and difficulties hindering the use of IT in teaching and learning. Insufficient instructional software and teacher competence were two of the many factors identified by the Preliminary Study (CITE, 2001). More importantly, many schools viewed ITEd as a move to 'technologize' education rather than an opportunity to re-engineer it to promote student-centred learning through the use of information technology. The realisation of a possible paradigm shift to re-engineer education via implementing IT was not clear. Nevertheless, a few schools have emerged successfully with innovative pedagogical approaches where clear vision and good school leadership occurred.

Some of the major findings from the review period from 1998/99 to the 2000/01 school year are summarised below. These findings were related to five aspects of the ITEd initiative:

Access and connectivity

- Hardware, software and networking infrastructure provisions had improved since the SITES-M1 study conducted in 1998. Student to computer ratios were reported as 13.4, 7.5 and 3.0 students per computer for primary, secondary and special schools respectively and more than 90% of students reported having computers at home that they were allowed to use.
- The dominant peripherals in schools were those such as video projectors which, the study proposed, are necessary for whole-class presentations.
- The most common usage of software used at primary and secondary levels was for teacher demonstration.
- The teachers used computers in lessons more often than the students.

Learning and teaching

- In both primary and secondary schools it appeared that longer exposure and engagement in computer use was helpful to students' building up a habit of using IT in school and in life in general.
- Despite the evidence of quantitative differences in the amount and use of computers in classrooms, there was little evidence reported of any paradigm shift in IT teaching and learning as advocated in the EMB's *Five-Year Strategy*.

Teachers' teaching with technology

- Teachers in both primary and secondary schools were reported as being the most competent in applications that they also considered to be important to their teaching, including word processing, spreadsheet, presentation software and Internet usage skills and the least competent in advanced multimedia and web design, which they also considered to be the least important.
- The subjects in which teachers reported having had the most satisfying experiences with using IT were Chinese, English, General Studies and Mathematics in primary schools and Chinese,

English and Mathematics in secondary schools. The majority of teachers perceived their role to be the transmission of knowledge.

- The teachers indicated that their preferred mode of professional development was workshops and demonstrations. While they wanted to learn how to communicate with students using email, the need to learn how to use the Internet to carry out collaborative project work with other schools was relatively low.
- A need was identified to integrate teachers' teaching with professional development provisions.

School policies and implementation

- While the school principals' responses suggested they regarded development of students' analytical powers and problem-solving abilities as high policy priorities, the actual practice was more concerned with enhancing teachers' abilities to present information effectively or interestingly. The principals reported that they considered their primary role to be to provide training opportunities and professional development opportunities for teachers and to plan resources, rather than becoming involved in the actual use of IT in their schools.
- Secondary schools were found to be more out-reaching to the broader network of other schools and the wider community than primary schools, but mostly schools were still behaving as individual units rather than members of the broader community.

Support and the community

- Between the SITES-M1 study and the Preliminary Study there was a reported shift in teachers' perception of the main obstacles to using IT, from lack of support and resources in the former to instructional software and teacher competence in the latter.
- Students reported being generally satisfied with the existing support and assistance from schools but indicated clearly that they wanted more provision of computer access.
- More than half the teachers had visited the ITERC or Teachers' Centres. HKedCity, ITEd Web and TSS were the most frequently used resources. They rated general satisfaction with IT courses and resource/support services.
- More than 70% of the teacher respondents reported positive experiences in sharing their experiences of IT use in teaching and learning with other teachers, although generally their views about the impact of IT were fairly reserved compared to the students' perceptions.

The present study will make reference to the methods and outcomes of these prior studies as appropriate in designing the research instruments and process and outcome measures to ensure, as far as possible, consistency and comparability of the findings. In this way, meaningful comparisons can be made across the studies to chart the progress of the implementation of the ITEd initiatives over the five-year period.

2.8 Methodological review of research in evaluating IT in education initiatives

The subsequent chapters will focus on a discussion of methodologies and approaches that have been used for evaluating outcomes of ITEd. Given the huge amounts of money invested in improving and maintaining the technology infrastructure of schools, it is not surprising to find that policy-makers and the public have great concern over the progress of ITEd initiatives and their impact on teaching and learning. The following are the most commonly used indicators for monitoring and evaluating large scale ITEd projects at the national or state level:

- Student/computer ratio,
- Power and sophistication of the computers,
- Number of classrooms wired and connected to the Internet,
- Participation of teachers and principals in professional development activities on the use of ICT,
- Self-reported use of ICT in teaching and learning,
- Perceived usefulness or impact of ICT on student learning.

These indicators, while useful for monitoring the progress of ITEd initiatives in terms of access, connectivity, teachers' professional development and classroom use of ICT, are gravely inadequate in answering the most important question about ICT in education – its impact on student learning (Haertel and Means, 2000; Padilla and Zalles, 2001). Indeed, the inadequacy of current practices in evaluating ICT effects has led to a recent surge in interest in the methodological issues in relation to technology evaluation. A number of reports and papers have been published which review the current practices, examine the critical issues, and explore new directions and methodologies for evaluating the effectiveness of educational technology (for example, Haertel and Means, 2000; Heinecke et al., 1999; Johnston and Barker, 2002; McNabb et al., 1999; Padilla and Zalles, 2001). The major issues and recommendations pertinent to the present study are summarised below.

2.8.1 An expanded definition and measurement of student learning outcomes

Most ITEd initiatives aim not only to promote the development of students' ICT competence, but also to enable them to apply IT in their learning to become better and more effective learners. Gawith (1994) makes an important distinction between technological literacy and information literacy in developing and measuring students' IT competence. The former refers to students' competence in the operation of the technologies, which is a useful but insufficient condition for effective learning. The latter refers to students' competence in searching, selecting, interpreting and presenting information, which enhances their ability to learn effectively across a range of subject areas. While the two concepts are necessarily related, they involve different kinds of understanding and cognitive processes, and must therefore be conceptualised and measured independently in any evaluation concerning the use of ICT in education.

Furthermore, to demonstrate that the use of ICT can improve learning effectiveness, it is not sufficient just to show that students' ICT knowledge and skills have increased. There must be evidence that students' learning in other subjects has also improved as a result of the increasing use of ICT. But the key question is: How is student learning defined? Heinecke et al. (1999) point out that an appropriate measure of learning outcome based upon a definition of learning as "the retention of basic skills and content information" would be very different from another which defines the goal of education as "the production of students who can engage in critical, higher order, problem-based enquiry."

Past evaluations have relied heavily on norm-referenced standardised achievement tests, students' self-reports, and/or ratings by significant others (for example, teachers or parents) as outcome measures. Haertel and Means (2000, p. 2) have commented that the use of standardised achievement tests as a student learning outcome measure is problematic: "While standardised academic tests may be effective measures of basic skills… they generally do not tap higher-level problem-solving skills and the kinds of understandings that many technology-based innovations are designed to enhance." The over-reliance of existing studies on self reported data and ratings by significant others has also been criticised because there are often discrepancies between what people report and what they actually do (Padilla and Zalles, 2001). Thus, the reliability and validity of assessing learning outcomes through self-report or ratings by others are often suspect (Johnston and Barker, 2002).

The implication is that there is a strong need to develop a new and expanded definition of student learning outcomes, and to explore ways for measuring students' learning gains in higher-level cognitive processes. A number of recommendations have been made for expanding the definition and measurement of student learning outcomes, including:

- Using multiple measures of student learning instead of a single measure,
- Performance assessment in extended authentic tasks,
- Mechanisms for students to demonstrate their information and higher-level cognitive skills (e.g., portfolios or learning records),
- Direct observation of participants' actions within learning contexts,
- Students' motivation, self efficacy, and attitude toward school and learning,
- Students' attendance, disciplinary referral, and/or drop out rates,

- Triangulation of self-reported data and/or ratings by significant others with data collected from other sources.

2.8.2 A combination of methodologies and approaches

The impact of ICT cannot be divorced from the teaching and learning processes, which are embedded within complex systems (the schools). Thus, the evaluation models and methods chosen for evaluating ICT must be able to capture and reflect this complexity (Heinecke et. al., 1999). Most authors on technology evaluation agree that no single evaluation methodology is adequate for addressing the multi-faceted nature of ICT innovations. Most recommend an adoption of a combination of methodologies and approaches, including both quantitative and qualitative measures in the evaluation.

A wide variety of methods can be used to gather information concerning the implementation, context, and outcome of ICT innovations. Some examples are:

- Performance assessments,
- Surveys,
- Observations,
- Interviews,
- Focus groups,
- Student and/or teacher logs,
- Diaries,
- Reflective journals,
- Document analysis.

While it is true that different data gathering procedures are sensitive to different sources of bias (Padilla and Zalles, 2001), combining the various methodologies can increase the richness, accuracy, and reliability of the data (Haertel and Means, 2000, p. 6) and maximise the validity of the data through triangulation (Popham, 1988).

2.8.3 Contextualised evaluation

Research on the effectiveness of educational technology has indicated clearly the important influence of context on both the implementation of the innovation and its impact (Bodilly and Mitchell, 1997; see also the review in Section 2.6 above). Coley (1997) argues that the impact of technology is multi-faceted, which cannot be fully understood without considering the interactions among students, teachers, and technology. There is therefore a “need for better and more comprehensive measures of the implementation of technology innovations and the context and contexts in which they are expected to function” (Haertel and Means, 2000). They suggest that in any educational technology evaluation, the following contextual factors must be included in the investigation:

- Vision of the innovation and its perceived value,
- Physical facilities available,
- The availability of resources,
- The climate toward technology, learning, and educational reform that exists in the classroom,
- Degree of support from leaders regarding technology innovation,
- School board policy that shape technology use,
- Demographic characteristics of the classroom, school, or community organisation, as well as students’ home.

The inclusion of important contextual variables in the evaluation will enable us to know not only whether ICT innovations have any impact, but more importantly, when and under what conditions the innovations will have the impact. This understanding is crucial for promoting an appropriate and effective use of ICT in education for enhancing student learning.

2.8.4 Tying data to standards

One of the issues in the evaluation of IT in education initiatives is that many of the instruments used are ‘home-grown’. The advantage is that the assessments are tailored to the specific goals of the particular project, but the disadvantage is that the ability to generalise or compare across initiatives is limited (Johnston and Barker, 2002). Furthermore, the results obtained from such instruments are difficult to interpret because of the lack of an objective referencing point for comparison.

Padilla and Zalles (2001, p. 32) argue that a good evaluation approach is to tie “the data collection activities to state or other technology standards so that linkages could be made with evaluation of progress on achieving these standards.” This approach provides a framework for assessing student, teacher, and administrator competencies against clearly defined criteria, and enables a more meaningful interpretation of the results across time or projects.

To conclude, a good research design for evaluating IT in education initiatives should:

- Focus on impacts on student learning both in terms of technology literacy and information literacy,
- Adopt a clear and shared definition of student learning outcomes,
- Identify and employ an array of methods to more accurately capture student learning outcomes,
- Use multiple methods for collecting multiple data from a variety of stakeholders, and triangulate the data from different sources,
- Employ both quantitative and qualitative methodologies,
- Include the important contextual factors in the investigation,
- Link the data collected to clearly defined standards and criteria.

This chapter has provided an overview of recent international literature on factors that contribute to the effective integration of IT into teaching and learning and the consequent impacts upon students’ learning outcomes. It has also described previous Hong Kong studies in order to set the context of ITEd in Hong Kong prior to this Study. The information provided in this review has been used as a basis for the theoretical framework for this Study and the methodology to be described in Chapters 3 and 4.

Chapter 3 Conceptual Framework, Research Questions and Definitions of Key Terms

This chapter presents the Conceptual Framework for the Overall Study, as developed from the Literature Review in Chapter 2. It also shows the link between the Conceptual Framework and the ten areas of concern identified for investigation in this Study and presents definitions of some key terms as used in this Study.

3.1 Description of the conceptual framework

Figure 3.1 shows the Conceptual Framework for the Overall Study that has been developed from the review of recent literature about the effects of IT on student learning outcomes, the interactive effects of a large number of variables, and a review of appropriate, contextualised methodologies. According to this framework, the impact of ITEd can be examined in terms of stimuli, processes and outcomes. It posits that the impact of ITEd is mediated by a complex interaction of the attitudes, capabilities and practices among the major stakeholders under the influence of the contexts and environment.

Stimuli

The Stimuli component captures the ITEd projects and initiatives that have been launched as a result of the *Five-Year Strategy.* These stimuli will act on the stakeholders and the environment which interact with each other to produce effects (positive or negative). The effects will manifest themselves as some kind of outcomes, which will in turn be fed back to influence the ITEd projects, as indicated by the feedback line in Figure 3.1.

Outcomes

The outcomes are some observable attributes that characterise the effects of IT in education. The ultimate outcomes of the ITEd initiatives must be students' cognitive and affective learning outcomes. Please refer to Section 3.3.2 for the definition of "learning outcomes" as adopted in the present Study.

Processes: Interactions among stakeholders

As has been explained in the Literature Review in Chapter 2, the cognitive and affective learning outcomes of students are influenced by a complex interaction of behaviours and stimuli from a range of stakeholders. These stakeholders include school administrators, teachers, students, parents and other community stakeholders external to the school. This last category includes policy makers, employer groups (trade associations), education and IT-related associations, non-government organisations (NGOs) with parents' education services and tertiary education institutions. The lines and arrows in Figure 3.1 indicate the complexity of these interactions. These interactions are also influenced by the context and environment in which they occur that includes school IT infrastructure, school IT culture and the community-wide IT culture, etc. – this critical interplay (Glenna and Melmed, 2002; Law et al., 2000; Sivin-Kachala and Bialo, 1998; Coley, 1997) is illustrated in more detail in Figure 3.2.

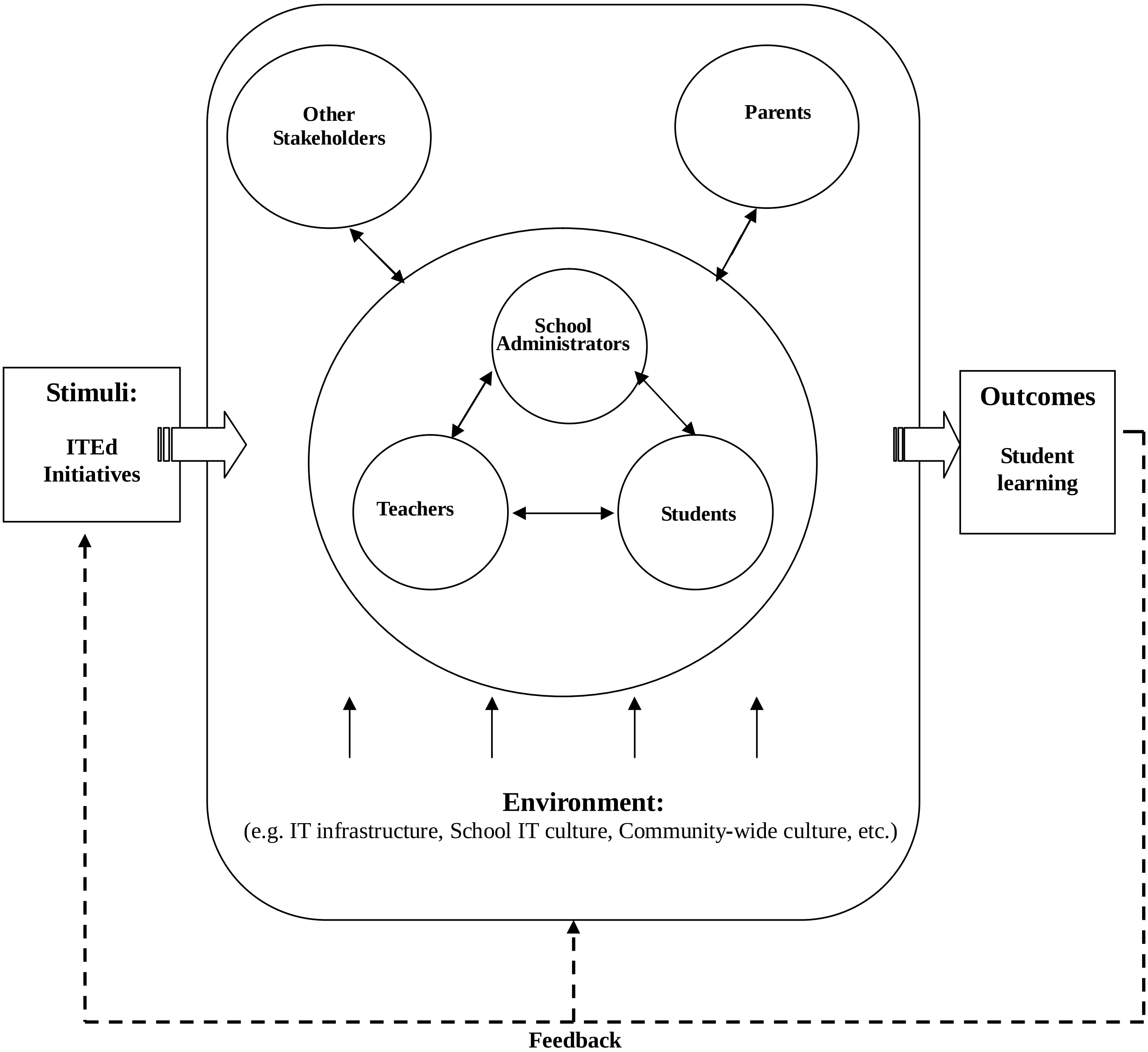


Figure 3.1: Conceptual Framework for the Overall Study

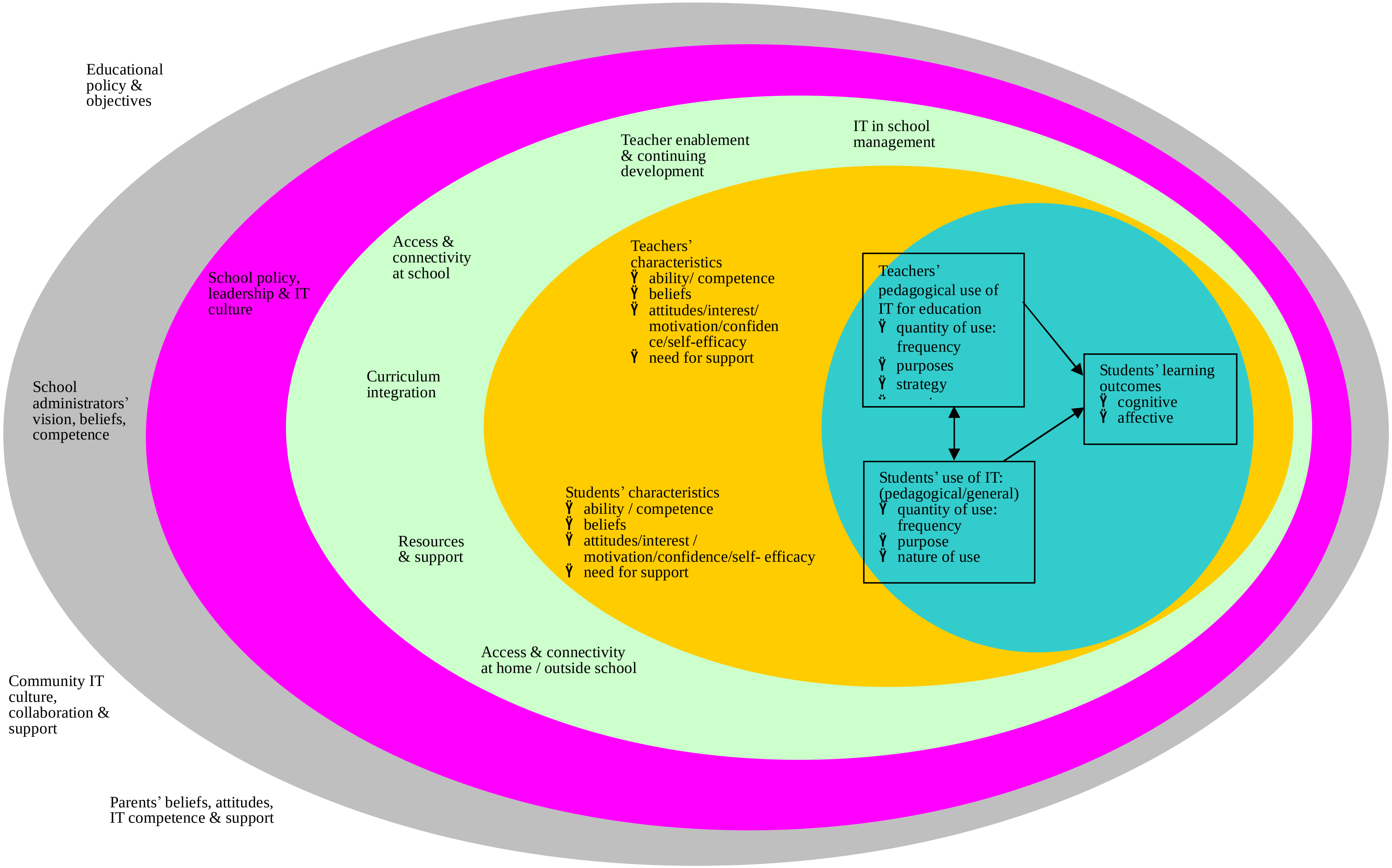


Figure 3.2: Interplay of critical constructs in determining student learning outcomes in ITEd

Figure 3.2 has been derived from the key ideas presented in the literature review. It represents the complex interactions of a number of important constructs on the outcome variables, students' cognitive and affective learning outcomes. It has been colour coded, not to suggest boundaries or a hierarchical network of contributing variables, but rather to suggest that this interaction takes effect at different layers of the school and wider communities. As this framework indicates, teachers and students are the core stakeholders, with teachers' pedagogical use of IT having direct interaction with students' use of IT for learning and both acting upon students' cognitive and affective learning outcomes. Impacting upon students' use of IT for learning are the variables of student characteristics such as their ability, competence, need for support and assistance, beliefs and attitudes like interest and motivation, IT competence and support, access and connectivity to IT in and out of school, resources and support in and out of school, and their parents' beliefs. Teachers' pedagogical use of IT can be influenced by personal factors such as their competence, which in turn can interact with their use of computers outside of school and their use of computers for classroom administrative tasks such as record-keeping, attitudes and beliefs including interest and motivation, and school leadership and IT culture which includes school policy, access and connectivity to IT and availability of resources and support. The school IT culture is in turn influenced by the school administrators' visions, beliefs and competence in the use of IT (for example in school management, which includes the way in which IT is used for communication within the school and with parents), and encompasses strategies that are implemented to promote teacher development and enablement and the extent of integration of IT across the curriculum in the school. It can be seen that there is an interaction between teacher characteristics, such as what motivates them to use IT, and curriculum integration and teacher enablement. Impacting upon all of this is the nature and extent of community collaboration, the IT culture within the community, the support available from the community and the system's educational policy objectives.

It can be seen that the Conceptual Framework is linked closely with nine of the ten areas of concern identified for investigation in this Study:

i. Teachers' IT competence,
ii. Integration of IT into the curriculum,
iii. Usage pattern of IT facilities (indicated in Figure 3.2 by access and connectivity at school and at home/outside school; students' use of IT for learning; and resources and support),
iv. Innovative pedagogical practices (indicated in Figure 3.2 by teachers' pedagogical use),
v. Student learning,
vi. Changes in approaches in school education and management (indicated in Figure 3.2 by school administrators' vision, beliefs and competence, school policy, leadership and IT culture, and IT in school management),
vii. Sharing of effective use of IT in teaching among schools (included in Figure 3.2 under community IT collaboration),
viii. Community collaboration,
ix. Cultivation of community culture.

The tenth key area of concern, comparison with ITEd in other places, is an important benchmark for assessing the overall progress and achievements of ITEd in Hong Kong.

3.2 Research questions

Based on the objectives and scope of study of the Project Specifications, the Literature Review and the Conceptual Framework, six sets of research questions have been formulated and used as a guide to develop the corresponding instruments and evaluative model for data analysis.

Question Set 1: Access, Connectivity and Usage

Questions in Set 1 measure the IT provision in terms of accessibility, connectivity, and usage.

Q.1.1 What IT access and system support have been provided to students and teachers in school, at home or in the community since the launch of various ITEd initiatives?
Q.1.2 To what extent have these IT access and system supports been provided, improved and utilised in ITEd? How do these IT access and system supports extend and integrate with teaching and learning?
Q.1.3 To what extent have these IT access and system supports been used by school administrators, teachers and students within and outside the school environment?

Question Set 2: Teacher Enablement

Questions in Set 2 are related directly to teachers, focusing on professional development, and the 'role' and 'achievement' aspects of teachers.

Q.2.1 What are the impacts of ITEd initiatives on professional development for teachers? What are the changes and developments in teaching and learning paradigms for teachers?
Q.2.2 What roles, apart from teaching, have emerged from teachers in ITEd? How have these roles promoted or inhibited ITEd amongst teachers and students?
Q.2.3 Are teachers satisfied with their achievements in ITEd? What are the obstacles and motivators of ITEd as perceived by teachers?
Q.2.4 What are the IT continuing professional development programmes and how do these programmes support ITEd? Are the teachers satisfied with these professional development programmes?
Q.2.5 What motivates teachers to acquire and utilise new IT skills? Do teachers find these IT skills useful?

Question Set 3: Curriculum, Pedagogy and Resource Support

Questions in Set 3 are used to review the impact of ITEd via curriculum and resource support, and to investigate the relationships between teachers' IT profiles and their various implementation of IT in teaching, possible effects of emerging paradigm shifts, assessment approaches and resource support in different aspects, etc.

Q.3.1 Is there any correlation between teachers' IT profiles and their ITEd implementations?
Q.3.2 How has IT been used in teaching and pedagogical designs? Is there any shift in teaching and learning paradigms since the launch of ITEd initiatives?
Q.3.3 What is the array of initiatives/activities/services organised by EMB (the former ED) to support ITEd? What is the effectiveness of these initiatives?
Q.3.4 Is there any evaluation or assessment strategy integrated with ITEd? How is ITEd benefited by these strategies?
Q.3.5 What are the resource support requirements, including personnel, software and hardware in schools? How have these resources been planned, implemented and utilised in ITEd?
Q.3.6 What is the current usage and curriculum integration of IT in schools?

Question Set 4: School and Wider Community Culture

Questions in Set 4 aim to find out the school and wider community culture in supporting ITEd.

Q.4.1 Has a school IT culture been developed? To what extent do schools have clear policies and visions about IT implementation? To what extent has IT been used in school management?
Q.4.2 Has a community-wide culture of using IT been developed? If yes, how has this community-wide culture contributed to ITEd?
Q.4.3 Who are the major stakeholders in promoting a community-wide culture of using IT? What kind of support has been provided by these stakeholders?
Q.4.4 What are parents' attitudes and expectations towards ITEd? How have parents interacted, communicated and provided feedback to schools since the launch of ITEd initiatives?
Q.4.5 What roles have the local community and business sectors played in ITEd?

Question Set 5: Student learning

Questions in Set 5 are intended to acquire more understanding of the attitudes, opinions and learning paradigms from the students' perspective.

Q.5.1 How, and to what extent, do students make use of IT as a tool for learning?
Q.5.2 What roles have emerged from students in using IT? To what extent have these roles been effective in promoting ITEd amongst peer students?
Q.5.3 How satisfied are students with their achievements in using IT for learning? What are the obstacles and motivators?
Q.5.4 What motivates students to acquire new IT skills? How useful do the students find such IT skills for their learning?

Question Set 6: Benchmarking and Sustainability

Questions in Set 6 are for benchmarking and comparisons between different places in the world, and for identifying how Hong Kong can maintain sustainable development in ITEd.

Q.6.1 How do the ITEd initiatives in Hong Kong compare with other countries?
Q.6.2 What are the possible and feasible adjustments to be made to enhance the effectiveness of ITEd in Hong Kong to achieve the visions in the Policy?
Q.6.3 How have IT resources been provided and managed, and what are the possible improvements?
Q.6.4 How can Hong Kong sustain the ITEd development and achievements?

3.3 Definition of key terms used in this Study

3.3.1 Paradigm shift

For the purpose of this Study, 'paradigm' has been defined as 'a set of beliefs, theories, or a worldview that is unquestioningly accepted' (Kuhn, 1962) or 'the corpus of knowledge, incorporating a number of widely accepted beliefs' (Ramachandran, 1998). In the context of this Study the paradigm in question is that of teaching and learning. Two common such paradigms have been described by Barr and Tagg (1995) as the 'Instruction Paradigm' and the 'Learning Paradigm'. The former, as its name implies, is concerned with delivering instruction, typically through direct exposition by the teacher. The latter, on the other hand, is concerned with 'producing learning with every student by whatever means work best' (Barr and Tagg, 1995).

In traditional Chinese education, a teacher-centred, instructional approach, with the teacher as the source and conveyor of knowledge, is the paradigm (Hon, 2003). On the other hand, the aim of the *Five-Year Strategy* was to shift from this largely textbook-based teacher-centred approach to a more interactive and learner-centred approach in which students can be helped to 'develop an understanding of the pervasive impact of IT on the society and their daily lives, higher order thinking skills, as well as abilities to seek, evaluate, organise and present information...[and] develop habits of life-long learning so as to ride on the tides of rapid changes' (p.1) Hence in order for this way of thinking, beliefs and practices to occur, it is necessary for some kind of shift in paradigm which involves, first, instigating shifts in 'the mind set and culture among teachers, parents and students; the way in which the curriculum is designed and delivered; student assessment etc.' (*The Five-Year Strategy*, p.1) which will lead eventually to a fundamental change in the way of looking at or thinking about the use of IT in schools. This kind of shift was defined in the CITE (2001) study as 'an opportunity to re-engineer education, which involved fundamental reforms in curriculum and pedagogy (p.ii)'.

Barr and Tagg (1995) have claimed that it is difficult to change paradigms, and this difficulty is certainly highlighted by the CITE (2001) report's indications that many schools had misinterpreted the notion of paradigm shift as 'implementing IT in education as a move to technologize education – finding ways of replacing or enhancing current activities with technology, such as replacing chalk and board by multimedia presentations/animations' (p.ii). This change of behaviour, in fact, is not a paradigm shift, as it is not necessarily a shift from the traditional, teacher-centred view of teaching. Hence in this Study it is necessary to look at whether, two years further on, there have been any further shifts in paradigm. There may in fact be degrees of paradigm shift, for example a partial shift in which stakeholders are attempting to use the tools and ideas of the new paradigm within the framework provided by the old (Barr and Tagg, 1995). Thus it is important for this Study not only to determine whether a paradigm shift has occurred, but to get some grasp of the extent and nature of any shifts that have happened.

3.3.2 Learning outcomes

For this Study the Project Team has adopted the definition of learning outcomes suggested in *Assessing the Impact of Technology in Teaching and Learning: A Sourcebook for Evaluators* (Cassady, 2002a; 2002b). Learning outcomes are composed of cognitive processes which can be measured directly and indirectly through achievement tests, performance on open-ended tasks and ratings by self and others. These cognitive processes include basic IT skills, higher-order cognitive processes, critical thinking and problem solving, creativity, knowledge and skills in the key learning areas and transfer of knowledge or skill. The affective domain includes attitudes; motivation and goal structures; and self-perceptions of ability or skill that include self-concept, self-esteem and self-efficacy. Affective outcomes can be measured by, for example, self-report measures, classroom observations and analysis of student performance data. This link between cognitive and affective outcomes is consistent with the view of CDC (2000), which states that the desirable outcome is 'mastering skills but also acquiring an understanding of the knowledge of IT, applying IT skills in information processing and developing a proper attitude towards IT usage...develop[ing] students' interest and curiosity in learning with IT, encourag[ing them] to be adventurous, [and addressing] ethical and safety issues relating to the use of ICT' (p.2). Please refer to Section 2.3 of the Literature Review (Chapter 2) for a further discussion of learning outcomes relevant to the context of this Study.

In the actual Study the measures of learning outcomes are more restrictive than we would desire because of resource and time constraints and unavailability of other sources of data including student attrition and achievement. In particular, higher-order thinking skills such as critical thinking and problem solving cannot be measured for reasons given in Section 3.3.5.

3.3.3 Pedagogy

Pelgrum et al. (1997) have described emerging pedagogies in which the school is more integrated into society, with information being more accessible to the public. Teachers are placing more emphasis on communication skills, guided independent study, individualized learning paths and student self-evaluation. Students engage in active self-learning that includes asking questions, engaging in teamwork and learning both in and outside of the classroom. Parents participate actively and co-steer the child's learning process. Pedagogical approaches adopted in IT-supported classrooms include various combinations of:

- Expository approach in which the teacher presents to students,
- Inductive approach in which students explore concepts by generating and testing hypotheses based on materials,
- Task-based approach in which students engage in creative production tasks,
- Problem-based approach in which students learn through investigating and solving authentic problems,
- Social-constructive approach in which students formulate and present their own views and challenge and debate each other's views.

While it is not a clear-cut concept to define, for the purpose of this Study the definition of innovative IT pedagogy is a pedagogy that moves more towards the task-centred, constructivist, problem-based end of the spectrum of teaching approaches listed above. According to our definition, innovative pedagogical practice incorporates not only mastery of skills but also acquiring an understanding of the knowledge of IT, applying IT skills in information processing and developing a proper attitude towards IT usage and well as developing students' interest and curiosity in learning with IT, encouraging them to be adventurous and considering ethical and safety issues relating to the use of ICT (CDC, 2000).

3.3.4 Curriculum integration

Integration refers to the integration of IT into everyday teaching and learning [Yepes-Baraya in Johnston and Barker (Eds.), 2002]. In the case of this Study it encompasses the use of IT as a tool in the key learning areas of Chinese, English, Mathematics, Personal Social and Humanities Education, Science and Technology, the Arts and Physical Education. Indicators of curriculum integration using IT are the extent to which IT has been used in the teaching of the curriculum and the nature of its use. The extent of use of IT may be measured both by how frequently it is used in classes and for what proportions of lessons. The nature of the use of IT refers to who uses it (i.e. teacher or pupils) and the purpose of its use (for example, whether as a presentation tool, for drill-and-practice or for other uses as a cognitive tool to support the learning activities taking place in the classroom).

3.3.5 IT literacy

Ba et al. (2002) point out that definitions of IT literacy can become obsolete quickly because of the rapidly changing nature of technology, but they suggest the definition can encompass trouble-shooting strategies, range of purposes connected to computing, skills in using common tools such as word processing, email and web searching, communication literacy, web literacy (i.e. using the web to find, select and judge information and skill at creating web-based materials for themselves). Figure 3.3 summarises the conceptualization of IT literacy utilized in this Study. In the broadest sense the higher level skills represented here as Generic Skills are the ultimate outcome of education generally and ITEd initiatives specifically. In a somewhat narrower sense, Information Literacy is a subset of these generic skills, but, as a concept, is broader than IT Literacy, defined here as 'capacity for purposeful and effective use of ICT technologies in one's own setting' and which mainly refers to the use of IT for learning purposes. For example, evaluating the suitability of retrieved information (Information Literacy) is a broader skill than accessing and retrieving the information (IT Literacy). At the most narrow level is technological, or Computer Literacy, that is the skills to use computers to perform a task. Within the scope of this Study, it is only possible to look at the two narrowest definitions, Computer Literacy and IT Literacy, since the other two are extremely complex to measure and there is no generally agreed method to measure them validly, reliably and effectively.

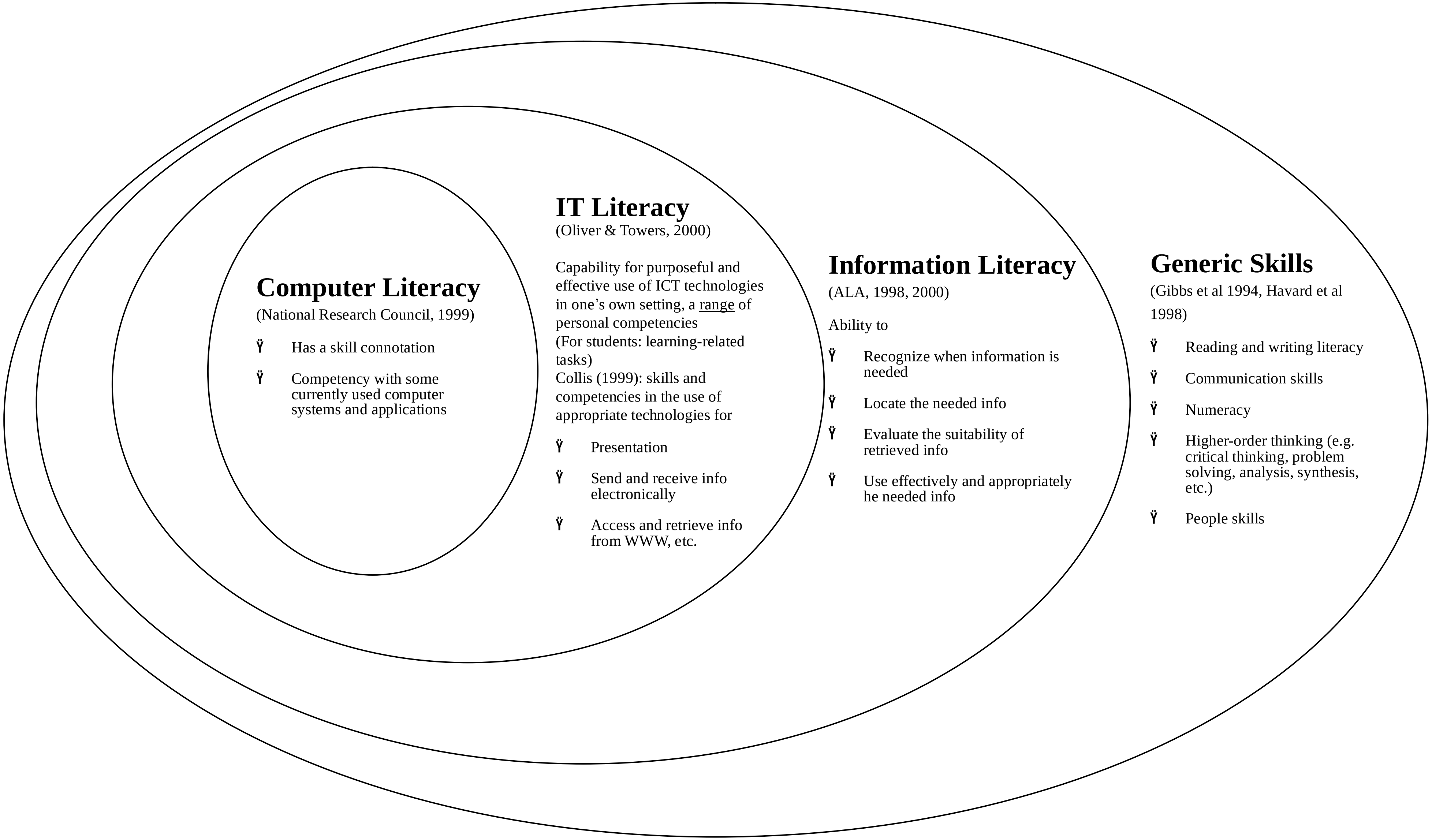


Figure 3.3: A conceptualization of the relationships between computer literacy, IT literacy, information literacy, and generic skills

3.4 Relationship between project objectives and research questions

Table 3.1 shows the relationship between the areas of concern stated in the Project Objectives (Chapter 1) and the Research Questions (Section 3.2).

Table 3.1: Relationship between the Project Objectives and Research Questions

Research Question Set	Areas of Concern as Stated in Project Specifications
1 Access, Connectivity and Usage	(iii) usage patterns of IT facilities
2 Teacher Enablement	(i) teachers' IT competence
3 Curriculum, Pedagogy and Resource Support	(ii) integration of IT into curriculum (iv) innovative pedagogical practices
4 School and Wider Community Culture	(vi) changes to approaches in school education and management (vii) sharing of IT in teaching (viii) community collaboration (ix) community-wide culture
5 Student learning	(v) student learning
6 Benchmarking and Sustainability	(x) comparison with ITEd initiatives in other places

As can be seen here, all the ten areas of concern have been addressed by the Research Questions. The following Chapter will describe the operational procedures for implementing the Overall Study.

Chapter 4 Methodology

4.1 Introduction

Methodologically, the most appropriate and strongest design for reviewing and evaluating the ITEd initiatives would be a longitudinal study that traces changes and makes comparisons over time with clearly defined process and outcome indicators to be judged against initial baseline measures obtained at the start of the initiatives, preferably with a comparable control group. However, given that the Project Team was brought into the evaluation near the end of the implementation, the scope and timeframe of the current Study makes it possible only to conduct a cross-sectional study at the final stage of the ITEd initiatives as stated in the document ***Information Technology for Learning in a New Era**: Five-Year Strategy 1998/99 to 2002/03* (the *Five-Year Strategy*) and to make comparisons where appropriate to the earlier SITES-M1 Hong Kong study (Law et al., 1999) and the Preliminary Study (CITE, 2001).

4.2 Overall approach

As indicated in the approved Project Plan, the objectives of the Overall Study were threefold:

(1) To review the progress of the ITEd projects with specific focus on each type of school (i.e. Primary, Secondary and Special) as well as the community as a whole, addressing the difference and diversity in each type of school.

(2) To evaluate the application and effectiveness of ITEd in light of the extent (i) to which schools/teachers have adopted and implemented pedagogical practices that use technology and (ii) to which the vision of promoting ITEd has been met as reflected by teachers' and students' enablement in their teaching/learning processes.

(3) To conclude the overall effectiveness (including the resources management perspective regarding manpower and budgeting, the student learning outcomes, and the pedagogical and cultural impacts) of ITEd projects.

In order to collect the data required to answer the Research Questions, a combination of quantitative and qualitative data collection methods was used. Quantitative instruments, including questionnaires and surveys, were used to give a broad picture, while the qualitative instruments, including observations, focus group and individual interviews, document and diary analyses, were used to probe more deeply into the phenomenon, enable triangulation of data (Popham, 1988), and give examples of unique uses. To set the context, identify specific targets and objectives of the ITEd initiative and chart progress and changes, an analysis was also undertaken of EMB documents pertaining to the implementation of the *Five-Year Strategy.* A combination of these methods is considered to be an effective way to increase the richness, accuracy and reliability of the data (Haertel and Means, 2000) because each has a different focus and is sensitive to different sources of bias (Padilla and Zalles, 2001).

4.3 Pilot Study

Prior to the commencement of the Overall Study, a Pilot Study was conducted to testify the research methodology and instruments designed. In accordance with the Project Plan, the purpose of the Pilot Study was "for establishing the methodology and research models, developing and testing instruments and descriptors for evaluating the ITEd initiatives in the Overall Study".

A two-stage sampling scheme was used in which schools were stratified by types (Primary, Secondary and Special) and then by degree of IT progress derived from the Initial Survey. Five school-related target groups were covered in the Pilot Study: school heads, school IT team members, teachers who were not IT team members (including specialists and therapists in special schools), students and parents. Two schools were randomly sampled from each stratum, resulting in a total of 10 primary schools and 10 secondary schools. For special schools, one school was selected randomly from each of the five purposely selected types selected by the Project Team as the most illustrative types.

The instruments that were trialed and the numbers of responses that were received are summarized in Appendix II.

The validity and reliability of the quantitative instruments were verified by making use of the data collected in the Pilot Study and by reviewing the questionnaires critically with respect to comments received from various sources, including the respondents and colleagues from EMB and the Steering Committee. Some minor amendments were also made to the logistics and processes of collecting the qualitative data. Further details of the processes of modifying the instruments for the Overall Study will be included in the following descriptions of the respective instruments.

4.4 Instrumentation

In developing the instrument sets, the Project Team considered the Conceptual Framework (Chapter 3) which represents the theoretical understanding of the ITEd process and outcomes identified for the populations being studied. The conceptual framework captures the input, process and outcomes of the ITEd projects with perceptions of and interactions among various stakeholder groups including school heads, teachers, students, parents, and other stakeholders. The environmental factors of ITEd such as IT infrastructure in schools, school culture and community-wide culture have also been included.

As can be seen from Figure 4.1 the data collection was in four distinct segments. The first was through the use of questionnaires and students' IT Literacy Assessment that were analysed quantitatively to provide the major findings of the study. The second segment consisted of data that were collected during visits to schools from the three nominated sectors, Secondary, Primary and Special, using both quantitative and qualitative instruments. The purpose of the data collected from these instruments was to complement, where appropriate triangulate, and probe more deeply into some of the issues covered in the quantitative analyses of the first segment. The third segment consisted of focus group/individual interviews designed to tap into the community IT culture, and to elicit suggestions about directions for further development. This was supplementary to the teaching and learning focus of the main part of the study and adds a different dimension to the overall picture of IT Education in Hong Kong. The fourth segment consisted of analyzing documents from EMB. The purpose of this document analysis was to give further insights into the nature and extent of the EMB input into the ITEd strategy which could be used, where appropriate, to triangulate with or explain aspects of the data.

The following sections describe the focus and structure of the instruments and give details of the procedures that were undertaken for their administration.

4.4.1 The Initial Survey

At the commencement of the Project, the Project Team decided that it would be very useful for the Project if schools could be stratified according to their readiness, progress and maturity to adopt IT in education. Hence the Project Team proposed and then conducted the Initial Survey in November 2002 in order to obtain data for stratifying the public sector schools in Hong Kong. A School Information Technology (IT) Survey Form was designed to collect school information in the four domains as stipulated in the *Five-Year Strategy*, namely Access and Connectivity, Teacher Enablement, Curriculum and Resource Support, and the Community-wide Culture. The School IT Survey Form consisted of 5 sections covering the domains of School Background, Computers and Systems/Peripherals, Teaching Staff Profile and Development, Utilisation of IT in the School, and IT Involvement in the School Curriculum. Respondents were asked to either tick boxes beside the appropriate options or to fill in relevant numbers. This instrument was prepared in consultation with EMB. After collecting the necessary data, the analysis revealed the degree of maturity and progress in using IT in education. Based on these results, a stratification scheme was designed (see Chapter 5).

To enable the data to contribute to the findings in the Main Study, a copy of the School IT Survey Form completed by the respective schools in the Initial Survey was attached with the questionnaires for School Heads for updating information. Schools that had not responded to the Initial Survey were sent a modified version and asked to complete and return it to the Project Team. They were mailed to all schools in all sectors together with the School Heads' Questionnaire.

I. Questionnaire Surveys and Students' IT Literacy Assessment

School Information Technology (IT) Survey

School Heads' Questionnaire	IT Team Members' Questionnaire	Teachers' Questionnaire	Specialists' / Therapists' Questionnaire (Special Schools only)	Students' Questionnaire	Parents' Questionnaire (Primary and Secondary Schools only)
				Students' IT Literacy Assessment	

II. School Visit:

- School tour
- Classroom visit
- School document analysis
- Focus group interviews with students (Primary, Secondary and Special Schools)
- IT activity daily log

III. Focus Group/Individual Interviews:

- Policy makers
- School heads
- Teachers / IT Team Members / Specialists / Therapists
- Students
- Parents (special schools)
- Employer Group (trade associations)
- Education and IT-related associations
- NGOs with parents education services
- SMC / SSB
- Tertiary education institutions
- ITEd project officers-in-charge / implementers
- Policy Makers / Directorates

IV. EMB Document Analysis

Figure 4.1 Summary of quantitative and qualitative instruments

4.4.2 Development of the core research instruments

The core research instruments adopted in the Study included:

1. Questionnaire Surveys
2. IT Literacy Assessment for students
3. School Visit:
   (i) School Tour
   (ii) School Document Analysis
   (iii) Classroom Visit
   (iv) Students' IT Activity Daily Log
4. Individual Interview
5. Focus Group Interview
6. Document Analysis – Documents from EMB

Table 4.1 illustrates the matching between the instruments, target groups and the sectors of Primary, Secondary and Special schools.

All of the core research instruments were developed by the Project Team with reference to the Project Objectives, the Research Questions, the Conceptual Framework and the Methodological Review. In the developmental process all instruments were subject to expert review conducted by the local consultants and colleagues from the EMB and the Steering Committee on Strategic Development of Information Technology in Education. The instruments were trialed in a Pilot Study in May 2003 and findings from this Pilot Study, combined with experiences from the field tests and advice from local and overseas consultants, were utilised in reviewing and revising into the final form used in the Main Study. All instruments were developed first in Chinese and in the majority of cases the Chinese versions were used in the data collection. The exception was those cases where the respondents were not readers of Chinese, in which case the English versions were used.

The instruments were first translated into English by the Project Team. The English language was further edited by staff of Centre for Professional and Business English of the PolyU.

In the Primary Sector English versions were requested by 1 school head, 45 teachers and 1 IT team member. In the Secondary Sector English versions were requested by 5 school heads, 238 teachers, 23 IT team members and 9 parents. There were no English versions of questionnaires requested by stakeholders in the Special School Sector.

Furthermore, a set of documents was delivered to the PolyU Project Team by EMB relating to the ITED initiatives in Hong Kong. A systematic analysis of the documents was also conducted by the Project Team.

Table 4.1: Matching between instrument, target groups and school sectors

Instrument	Target Group	Sector
Questionnaire	School Heads	Secondary/Primary/Special Schools
	IT Team Members	Secondary/Primary/Special Schools
	Teachers	Secondary/Primary/Special Schools
	Specialists/Therapists	Special Schools
	Students	Secondary/Primary/Special Schools
	Parents	Secondary/Primary Schools
IT Literacy Assessment	Students	Secondary/Primary/Special Schools
IT Activity Daily Log	Students	Secondary/Primary/Special Schools
School Tour	N/A	Secondary/Primary/Special Schools
School Document Analysis	N/A	Secondary/Primary/Special Schools
Classroom Visit	Teachers/Students	Secondary/Primary/Special Schools
Individual Interview	Students	Special Schools
	Parents	Special Schools
	School Heads	Secondary/Primary Schools
	Representatives	Tertiary Education Institutions
	Policy makers/senior officials/ ITEd project officers in charge of initiatives	EMB/CITB/ITSD
Focus Group Interview	School Heads	Special Schools
	Teachers (and Specialists/ Therapists for Special Schools)/Students	Secondary/Primary/Special Schools
	Chairmen/Directors/ Representatives	Educational and IT-related Associations/SMC/SSB
	Representatives	NGOs which provide parent education services
	Chairmen/Representatives	Trade Associations

4.4.3 Questionnaire Survey

Target groups

The questionnaires used in this Study were designed for four of the stakeholder groups indicated in the Conceptual Framework, namely, students, teachers (including IT Team members, and specialists/ therapists of special schools), school administrators (i.e. school heads) and parents. The questionnaire instruments were designed to survey various aspects of each target group in order to obtain data about the ITEd initiative effectiveness and to answer the research questions as set out in this Study. According to the Conceptual Framework, each target group, while having its own contextual attributes (IT competency level, affective characteristics etc.), is subject to the stimuli of ITEd initiatives, the influence of a range of variables within the school and wider community environment and interactions with other stakeholders. The questionnaires were designed to survey the respondent's observations and evaluations of various aspects of these inter-related components.

On the basis of the findings from the Pilot Study, comments of the respondents and EMB, some changes were made to the various questionnaires to improve their clarity and appropriateness for the research questions. The major changes included:

1. Adding new questions to the existing questionnaire based on comments or suggestions from EMB or other sources to tap into important new variables.
2. Modifying the existing questionnaire items to make them more aligned with the items of the Preliminary Study to enable charting of changes.
3. Modifying the wording or options to improve clarity of the question and/or enhance the appropriateness of the options given.

It should be noted that the instruments for students and parents included provision for identities to be coded using the student's class name and number, hence making it possible to link students' and parents' responses. For the teachers' instruments, a deliberate decision was made not to identify individual teachers, although the group responses for a school can be identified by school code. This was done for two reasons. First, in the Pilot Study, some teachers indicated that they might not respond frankly and honestly if there was a chance of their responses being traced back to them as individuals, even through the use of a coding system. Second, according to the Pilot Study experience, there was no cause to trace the teachers' questionnaires back to individuals, and the school coding was found to be sufficient for the purposes of the Overall Study.

Some specific questions from the Preliminary Study were retained to allow comparison to be made. Please refer to Appendix III for details of these.

School Heads' Questionnaire

School heads were surveyed by the School Heads' Questionnaire. There were 21 items in the questionnaires for Primary and Secondary Schools respectively and 20 items in the questionnaire for Special Schools. The items were designed to survey a broad range of facts and opinions as reflected by the school head:

- availability and nature and frequency of personal use of computers at home and at school,
- self-reported competence levels and role in ITEd,
- availability and use of computers in school,
- ITEd goals,
- availability, purposes and usefulness of computers as communications tools (e.g. school intranet),
- expenditure on ITEd in school,
- usefulness of IT training for improving teaching/administration,
- integration of ITEd in Key Learning Areas,
- impact of ITEd on students, teachers and curriculum, school administration and management,
- factors/personnel contributing to and affecting planning and implementation of school IT policy,
- resource and support requirements,
- promotion of and collaboration and sharing within school and wider community IT culture,
- difficulties/obstacles with ITEd implementation,
- suggestions for future ITEd directions/implementation.

For the sampled schools (i.e. 150 primary schools, 150 secondary schools and 30 special schools selected for taking part in the Study – please refer to Section 5.2 for details), questionnaires for all target groups, including the School Heads', were delivered to the schools by the fieldwork staff member(s) on the date of the conducting of fieldwork.

For the "non-sampled" schools (i.e., schools that were not selected to participate in the main part of this Study), the Heads' Questionnaires were mailed to the schools, with covering letters from EMB and the PolyU Project Team. They were requested to return the completed questionnaires to the PolyU on or before 19 November 2003 either by ordinary post with enclosed self-stamped and self-addressed envelope, or by fax. If they had any queries regarding the Study, they could either contact the Project

Manager directly, or via E-mail set up specifically for the Study.

Follow-up calls were made to non-respondents immediately after the submission date of 19 November 2003. If needed, the questionnaire was faxed to or mailed to the schools again.

Teachers' and Therapists'/Specialists' Questionnaires

Teachers of Primary, Secondary, and Special Schools were surveyed by the Teachers' Questionnaire. Specialists/therapists in Special Schools were surveyed by a customised set of questionnaires based on the Teachers' Questionnaires. As a key link in the Conceptual Framework, teachers receive ITEd stimuli in terms of professional training, hardware and software support, curriculum resource support and manpower support (in terms of ITC and TSS). As the front-line practitioners of ITEd, the teachers' influence on and contribution to ITEd initiative effectiveness is important. The Teachers' Questionnaire was designed to collect information about teachers' use of IT and their views on various aspects of ITEd. There were 22 questionnaire items for primary/secondary schools and 24 questionnaire items for teachers of special schools (25 questionnaire items for the Specialists'/Therapists' Questionnaire) designed to survey, among other things, the following aspects:

- availability and nature and frequency of personal use of computers at home and at school,
- self-reported competence levels with IT and ITEd,
- availability and adequacy of resources and support for teaching,
- perceived changes in school and impact on teachers since launching of ITEd,
- frequency and nature of use of IT for teaching and administration (including student assessment),
- participation in and satisfaction with IT professional development provided by different agencies,
- difficulties/obstacles with ITEd implementation,
- preferred lessons for using IT and satisfaction with these,
- specific hardware, software and applications used,
- personal motivation to use IT.

The Specialists'/Therapists' Questionnaire was modified to match better with their job duties and involvement in ITEd in the Special Schools. Moreover, open-ended questions were added to tap their opinions on what different assistive devices can assist the students in participating in ITEd activities and how this can be done.

All teachers/specialists/therapists from the sampled-schools were surveyed by the Teachers'/ Specialists'/Therapists' Questionnaire. The PolyU fieldwork staff member(s) delivered the questionnaires (with return envelopes) to the school on the date of the fieldwork, and handed them over to the designated staff member, who was requested to distribute the questionnaires and return envelopes to the school staff concerned. The Project Team contacted the respective school representatives one week later, and arranged for the collection of the completed questionnaire. Non-responses were followed up, if necessary, through the designated staff members of the school concerned.

IT Team Members' Questionnaire

Those teachers who were also IT team members were invited to fill in the IT Team Members' Questionnaire in addition to the Teachers' Questionnaire. This questionnaire was designed to probe into the school's adoption of IT in education, the difficulties encountered and the assistance required.

There were 5 items in this questionnaire, surveying the following:

- perceived usefulness of various stakeholders' contributions to school IT policy and planning,
- factors affecting school policy and planning,
- role of IT team in school,
- resource support requirements,

- difficulties/obstacles with ITEd implementation.

The distribution and collection of the questionnaires followed the same method as that adopted for the Teachers' Questionnaires.

Students' Questionnaire

Students were surveyed by the Students' Questionnaire. There were 31 and 32 items in the Students' Questionnaire for Primary and Secondary/Special Schools respectively. Questionnaire items were designed to survey, among other things, the following aspects of students:

- availability and nature and frequency of personal use of computers at home and at school, including access to and use of Internet and school intranet and use in the school curriculum,
- self-reported competence levels and role in ITEd,
- numbers of personal e-mail accounts and homepages,
- use of IT for school-related communication such as submitting assignments,
- adequacy of resources and support for learning in school,
- preferred uses of IT in the school curriculum and preferred teacher practices in using IT in the curriculum,
- perceived impact of IT on personal learning,
- encouragement from teachers to use IT,
- use and perceived usefulness of HKedCity for learning,
- support needed for using IT and availability and adequacy of support,
- obstacles to learning because of school's use of IT in teaching,
- attitudes towards ITEd.

The questionnaires for Primary students and Secondary students were essentially the same, except for some slight variations to cater for different curriculum subjects offered. The Secondary Students' Questionnaire contained one extra item to collect data about streaming and optional subjects taken by Secondary students. One special item (number 31) was included in the Students' Questionnaire for special schools, regarding requirements for special assistive devices in IT use.

The Project Team called the designated staff member of each sampled school to explain the sampling method and arrange the date to conduct the Students' Questionnaire Survey. The sampled students were gathered at a time and venue arranged by the School. The PolyU fieldwork staff member(s) explained to the students the purpose of the questionnaire, and stayed in the venue to answer questions if needed. Students were given 30 minutes to complete the questionnaire individually. The fieldwork staff member(s) then checked and collected the completed questionnaires from the students.

Parents' Questionnaire

There were 11 items in this questionnaire, which focused on the following:

- Demographic information about the respondent (relationship with the student, highest level of education, and self-perceived level of IT literacy),
- home computer equipment and the student's usage as perceived by the parent,
- students' need for support with IT and resources and support offered by parents,
- the parent's communication with the school by means of IT,
- student's IT training participation outside school,
- the parent's beliefs and attitudes about IT and ITEd, and its impact on student learning outcomes,
- parents' participation in IT training offered by school.

For all those students who were selected for IT Literacy Assessment, their parents were selected for a self-administered questionnaires survey. The school was requested to help distribute the questionnaires to the parents via the primary and secondary school students, and to collect the filled-in questionnaires when completed.

The PolyU fieldwork staff member(s) delivered the questionnaires (with sufficient numbers of return envelopes) to the school on the date of the fieldwork, and handed them over to the designated staff member, who was requested to distribute the questionnaires and return envelopes to the students concerned and reminded them to collect and bring back the completed questionnaires to the school. The Project Team contacted the respective school representatives one week later, and arranged for the collection of the completed questionnaires.

4.4.4 IT Literacy Assessment (ITLA)

Purpose and format

After the Pilot Study, in response to the comment that the existing test focused too narrowly on computer knowledge and skills, the design of the version of the 'IT Competency Test' used in the Pilot Study was revised to include self assessment by students of their generic skills in using IT for learning-related tasks. The new instrument was re-named 'IT Literacy Assessment'. The purpose of the IT Literacy Assessment was to assess individual students' IT literacy. It is divided into two sections.

The first section consisted of 25 multiple choice items which aim to measure students' basic IT-related knowledge and skills as defined by the published Information Technology Learning Target 2000 for the relevant stages. The intention was not to differentiate or discriminate between the performances of the students but to identify the extent to which individuals were able to grasp the basic IT-related knowledge and skills expected of the stage. Items were developed to understand the extent to which the students had acquired the stage-specific knowledge and skills. It should be noted that, in the first section of the assessment, a 20% tolerance level was set up to allow for random variation which may affect the test score from a variety of sources, such as distractions in the assessment environment, the occasion of testing, the rater, the examinee's state of mind at the time of testing, etc. (Chatterji, 2003). However, it must be emphasised that this 20% tolerance level is not intended to be a cut-off point implying pass/fail or competence/incompetence. As a matter of fact, students' competence should be conceived of as a continuum of skills rather than a dichotomy, and any chosen tolerance level is, of necessity, arbitrary (Glass, 2003).

According to the *Information Technology Learning Targets 2000*, specific learning targets for IT literacy were developed for 5 target stages (i.e. stage 1: P1 to P3, stage 2: P4-P6, stage 3: S1-S3, stage 4: S4-S5 and stage 5: S6-S7). The specific content of the test was developed to assess the IT literacy with respect to the learning targets of each stage. Different categories of items were designed to assess student's IT literacy in different aspects, hence a different set of items was developed for each of the 5 stages.

The second section of the instrument aimed to measure students' self-perceptions of their generic IT skills for performing various learning-related tasks. Students were asked to rate, on a five-point scale, their own level of literacy in each of the 20 items provided.

It should be noted that it was beyond the scope of the IT Literacy Assessment to attempt to measure affective variables such as belief, attitudes, interest and motivation. These have been addressed in the Students' Questionnaire, Student Focus Group Interviews and, to a certain extent, students were encouraged to express their attitudes in the IT Activity Daily Log.

It must be stressed again that the IT Literacy Assessment was only one of the sources of data collected in the Study to assess the impact of ITEd initiatives on teaching and learning. Other process and outcome measures/indicators were included in different instrumentations of the Study, and were used and triangulated to reveal a more complete and holistic picture of the phenomena.

Development and validation procedure

The development of the ITLA instrument was the result of a series of refinement processes including an examination of the comments collected and remarks made by respondents on each question in the first draft, as well as comments from EMB, Steering Committee on Strategic Development of Information Technology in Education, and one of the Project's local consultants. The process of developing the final ITLA instrument also took into account the item-total correlation, difficulty index and discriminating index from the administration of the draft instrument in the Pilot Study. According to the difficulty indexes calculated on the Pilot Study data, some items discovered to be 'too difficult' for some target groups were deleted from the final version of the respective tests and others showing extreme percentage counts were identified and modified. The modified set of questions underwent a further trial in two schools and was evaluated by two school heads who were experienced in teaching IT (computer studies) in secondary schools before finalizing into its existing form for administration in the Main Study.

Procedure for administration

The sampling procedure for the IT Literacy Assessment is described in Chapter 5. The Project Team contacted the designated teacher or staff member of each sampled school to explain the sampling method and arrange the date to conduct the IT Literacy Assessment. Similar to the administration of the Students' Questionnaire, the sampled students were gathered at a time and venue to be arranged by the School. The PolyU fieldwork staff member(s) explained to the students the purpose of the ITLA, and that the results would be treated confidentially. They also explained explicitly to the students that the ITLA was not meant as a means of assessing their individual IT competence.

Students were given 30 minutes to complete the ITLA, during which they were not allowed to discuss with other students. The standardized IT terms were explained if needed according to the glossary prepared by the Project Team for the fieldwork staff member(s) during the training session. The fieldwork staff member(s) checked and collected the completed questionnaires from the students at the end of the session.

4.4.5 Qualitative methods and instruments

There are at least four kinds of qualitative research designs, including phenomenology, ethnography, grounded theory and case study. The selection of the most appropriate method is based on the nature of research questions asked and the type of involvement of the researchers and people under study. In the present study, the phenomenological approach (Marton and Booth, 1997) was utilized, this approach being intended mainly to describe phenomena which exist as part of the world in which we live. The phenomena may be events, situations, experiences, or concepts of target groups, in this case within the context of ITEd in Hong Kong. This kind of research begins with the acknowledgment that there is a gap in our understanding and that the clarification or illumination will be of benefit. In other words, it does not necessarily provide definitive explanations but it does raise awareness and increase insight. The subsequent paragraphs outline the related use of qualitative instruments in the present project, which are summarized in Table 4.2.

A qualitative approach to data collection usually involves direct interaction with an individual on a one-to-one basis or in a group setting. There was no exception to this in the present study and the main methods of collecting qualitative data were:

- Observation (non-participant observation),
- Collection and analysis of school and student-generated documents as supplementary data,
- Individual/Focus Group Interview.

Table 4.2: Summary of qualitative instruments used in the Study

Methods and Instruments	School Sectors			Other Stakeholders
	Primary	Secondary	Special	
(1) School Visit				
Ÿ School Tour	ü	ü	ü	
Ÿ School Document Analysis	ü	ü	ü	
Ÿ Classroom Visit	ü	ü	ü	
(2) Individual Interview				
Ÿ School Heads	ü	ü	N/A	
Ÿ Students	N/A	N/A	ü	
Ÿ Parents	N/A	N/A	ü	
(3) Focus Group Interview				
Ÿ School Heads	N/A	N/A	ü	
Ÿ Teachers/IT Team Member/ Specialists	ü	ü	ü	
Ÿ Students	ü	ü	ü	
(4) Individual/Focus Group Interview with other stakeholders				ü
(5) Document Analysis – Documents from EMB	ü	ü	ü	ü

Based on the outcomes of the Pilot Study, some modifications were made to some of the qualitative instruments. Most of these were minor improvements to the logistical procedures. In the case of the focus group interviews, four new areas of discussion were added to elicit more information about family use of IT, use of IT in schools, sufficiency of school IT facilities to help students to learn, and students' self-perceived effectiveness of using IT in learning.

4.4.6 School Visits

The School Visit was utilised for the purpose of collecting observational data, analysing school documents and collecting more detailed information about the use of IT in the schools. The instruments used in the School Visit are listed and described in detail in this section. With the exception of the Students' IT Activity Daily Log, the instruments used for data collection in the School Visit were mainly qualitative in nature. The School Visit consisted of the following components:

Ÿ School Tour
Ÿ Analysis of School Documents
Ÿ Classroom Visit
Ÿ Student IT Activity Daily Log

School Tour

The objective of the School Tour was to collect qualitatively a general overall impression of the utilization of IT in class and outside class, the feeling of whether or not there was an IT culture in the school, and a description of the resources, facilities and support services available in the school and how they were used. It was also used to identify any unique uses of IT within the school.

The Project Team contacted the designated school staff member to confirm the schedule for the School Tour before the School Visit. During the School Visit, the designated school staff member guided the fieldwork staff member(s) for the tour, which lasted for approximately 30 minutes' duration. The route was designed by the school personnel. After the guided-tour, the fieldwork staff member(s) walked around the school freely for about 10 to 15 minutes to capture an overall impression. The fieldwork staff member(s) recorded their observations on the School Tour Form.

After each School Tour, the two fieldwork staff members reviewed and discussed their observations for the purpose of arriving at a common consensus.

School Document Analysis

The purpose of the school document analysis was to collect qualitatively an overall impression of the schools' philosophies, policies and culture through an analysis of the relevant school documents. Examples of documents examined included: documentation about the objectives, mission statements and design of ITEd programmes, IT team meeting minutes, special funding sources reported, plan or record of assessment/evaluation and professional development usually conducted in the school, and examples of worksheets. The main focus of the analysis is to identify the extent to which there were general signs of vision, leadership and enthusiasm about the way IT was embraced in the school.

A suggested list of documents to be reviewed by the fieldwork staff member(s) was sent to the school before the fieldwork staff members' visit.

The location for reviewing the documents was arranged by the school. The fieldwork staff member(s) were required to complete the Document Analysis Form. If the documents requested were not made available by the school, the fieldwork staff member(s) followed up the request with the designated school staff member on the date of conducting the fieldwork.

Classroom Visit

The objective of the Classroom Visit was to collect qualitatively an overall impression of how IT was being used in the selected classrooms. Some of the things to be observed included: whether the classes were conducted in the classroom or computer laboratory, what facilities were available in the room and whether/how these were used, whether the teaching was teacher-centred or student-centred, how much time the students spent with hands-on IT use, any observed effects on the students' interest, motivation or understanding in the lesson, teachers' and pupils' skills in using the IT, etc. It was hoped that through this process, unique and innovative practices in ITEd would be identified.

Non-participant observation was used to collect data during the classroom visit, as this was considered relatively less obtrusive. Thus, the observers did not interact at all with those whom they were observing. Prior to the data collection, a training session was organised to train and guide observers to make brief sampled observations over periods of time, and the observation forms helped to ensure consistency of the data being recorded.

The Project Team contacted the designated school staff member for confirming the schedule. The designated staff member(s) then notified the respective teachers before the fieldwork was conducted.

Each class was observed independently by two fieldwork staff members, one of whom was the Principal Investigator/Investigator/Senior Project Officer. Upon arrival in the school at the pre-arranged time, the fieldwork staff members went directly to the classroom, no pre-observation briefing with the teacher being required. At the beginning of the classroom observation, the class teacher explained the purpose of the classroom visit to the students. He/she also made it clear to the students that the observation was not meant for assessing the students' learning performance.

The fieldwork staff members made notes of their observations on the Classroom Visit form. After the class, they held a 5-minute follow-up discussion with the teacher concerned.

After each Classroom Visit, the two fieldwork staff members reviewed and discussed their observations for the purpose of arriving at a common consensus.

IT Activity Daily Log

The IT Activity Daily Log was not a qualitative instrument but its description has been included here to show its place in the overall context of the Study. It was designed to capture how the students made use of IT in support of their learning activities and in their daily living, particularly for activities outside school hours. In order not to cause too much burden on the student, the IT Activity Daily Log instrument was designed in the form of a log book where they were asked to fill in their IT-related activities in terms of pre-defined codes. Admittedly this instrument was not exactly a “diary” in its usual sense. However, the log-book approach was a good compromise between conflicting factors such as students’ workload (log-book type would be better), possibility of ambiguity in interpretation of activities (log-book type was better) and capturing power of the instrument (free-form diary would be better).

After the students had completed the ITLA, the fieldwork staff member(s) distributed the IT Activity Daily Log to them. The fieldwork staff member(s) explained the purpose of the instrument and the guidelines for the IT Activity Daily Log to the students. Students were required to fill in their IT-related activities for 7 days, and return the completed IT Activity Daily Log to the designated staff member of the School. The Project Team contacted the respective school representatives one week later, and arranged for the collection of the completed student logs.

4.4.7 Individual Interviews

An interview can be highly structured, semi-structured or unstructured. A semi-structured interview format was adopted to cover a series of open-ended questions based on the topic areas the research was to cover, such as students’ habits, competency and satisfaction in applying ITEd. The open-ended nature of the question defined the topic under investigation but provided opportunities for both interviewer and interviewees (such as students) to discuss some topics in more detail. If necessary, the interviewers went into the interview with the aim of discussing a limited number of topics. For instance, in the case of student interviews, the students may have been asked to highlight ways in which, and the degree to which, ITEd is important in their life roles. Subsequent questions would depend on how the interviewee responded. After the interview, audio-recorded data were transcribed for content analysis.

Individual interviews were conducted with school heads of Primary and Secondary Schools, as well as with students and parents of Special Schools. Interviews were individual, semi-structured and face-to-face except for the case of parents of Special Schools with whom face-to-face interviews could not be organized after repeated attempts, in which case telephone interviews were conducted. Respondents’ perceptions of various aspects relating to ITEd initiatives, levels and paradigm shifts in IT usage and development were explored.

4.4.8 Focus Group Interviews

Focus group interview was one of the qualitative data collection methods used in the Study. It was intended to serve the following key purposes:

- to provide an orientation or preliminary diagnosis on research issues;
- to facilitate the design and refinements of other instruments;
- to supplement research findings.

A focus group interview is a loosely-structured, free-flowing interview with a small group of people of 4-8. It is not a rigidly structured question-and-answer session, but a flexible format that encourages discussion. The interviewer acts as a facilitator to induce participants to talk and discuss among themselves about the focused topics, thus generating a lot of verbally reported data and opinions. It probes into people's minds through interactive discussion to find out opinions and other details.

Focus group interviews were conducted with all key stakeholders from the schools (school heads of special schools, teachers, IT team members and students) and with all other key stakeholders in the community (such as representatives from tertiary education institutions, trade associations, IT/education related organizations, etc.).

To meet the stated purposes of the Study, the key functionality of the focus group interview was to collect more in-depth information from different stakeholders of ITEd in Hong Kong, and to see how the vision and missions set in the Five-Year Strategy have been fostered and how the achievements of ITEd initiatives are perceived. Specifically, these interviews focused on future directions and modifications needed in ITEd and the following four dimensions were identified:

Ÿ Perception and awareness of the overall ITEd direction,
Ÿ Achievements relating to ITEd initiatives,
Ÿ Implementations of ITEd initiatives,
Ÿ Key success factors and recommendations.

For each of these dimensions, there might be different areas of concern for different target groups. The views and opinions about these areas of concern were addressed collectively through focus group interviews with a wide range of target respondents.

An interview guide was developed for each target group addressing these concerns, and all interviews were conducted with reference to this guide. The key areas of concern of the focus group interview for each target group are summarised in Appendix IV.

The sampled students, nominated teachers, IT team members and Specialists/Therapists, and the other stakeholders group (see Chapter 5 for details of the sampling process) were gathered at a time and venue either arranged by the School or by the Project Team.

At the beginning of each interview, the PolyU fieldwork staff member(s) explained to the participants about the purpose of the discussion and described the procedures in place for ensuring confidentiality of responses. Each discussion session was of duration of around 30 to 60 minutes for student focus group interviews, and up to 2 hours for other stakeholders. The fieldwork staff members followed the focus group interview guideline that was provided to them during the training session. The whole discussion session was tape-recorded, with the agreement of the participants.

4.4.9 Document analysis – documents from EMB

A set of documents relating to ITEd initiatives was delivered to PolyU by EMB. A systematic analysis of the set of documents was conducted to get information about those ITEd projects that have been launched after the announcement of "the *Five-Year Strategy*" in Hong Kong.

Each document was scrutinised by a senior project officer who had been fully trained and briefed in the technique. Based on an initial screening of the documents, groups of categories were identified for each research question set. A framework for analysis (Appendix V) was designed based on these categories. In the first level of analysis the data were categorised according to the framework. Where the original transcript was in Chinese, the senior project officer summarised it in English and provided direct translations of relevant quotations. The summaries were cross-checked by senior members of the Project Team. The second step of the qualitative analysis was to make an overall summary of the similarities and differences within each of the categories identified for the first level of the analysis. In both the first and second levels of the summaries, links were made to the original documents to enable easy tracking for verification or further clarification of details. Relevant data from the analysis were utilized where appropriate to provide further evidence for answering the sets of Research Questions of the Study.

4.5 Special arrangements for special schools

To maintain consistency and comparability of the data across school sectors for reviewing the progress and evaluating the ITEd initiatives in Hong Kong, the same core methodology was adopted for Primary, Secondary and Special School Sectors. However, some slight modifications to the methodology were required to customize the instruments and/or to adapt to the unique context or needs of the Special Schools. These include:

- Modifications were made to some of the items in the School Heads', Teachers' and Students' Questionnaires, with some items or options modified/added to deliberately capture information unique to the context of special schools,
- Separate focus group interviews were conducted for school heads, teachers, IT team members, and specialists/therapists. The rationale for having focus group interviews for school heads in this sector is that the heads of special schools form a heterogeneous group since each school type is represented by only a very small number of heads, hence it was decided that bringing them together in the same interview would be the best approach to obtain some general overviews through comparing and contrasting their individual situations.
- For special school students who are at primary or secondary academic level, the corresponding IT Literacy Assessment set of primary or secondary school sector was used,
- For students with mild or moderate/severe mental handicaps (MH), direct observation of their performance on IT-related tasks was considered to be more functional for data collection and reflect better their actual IT competence than a pen-and-pencil test. Thus, two task-oriented sets of IT Literacy Assessment were developed in consultation with EMB to match the respective IT competence range of these groups of students. The IT Literacy Assessment for students with mild mental handicaps focused on assessing their ability in performing basic learning-related computer tasks such as file editing and management, Chinese word processing and simple PC operations and trouble-shooting, etc. The IT Literacy Assessment for students with moderate/ severe mental handicaps assessed their ability in using computers as an alternative learning medium. Their ability to use typical computer-assisted learning (CAL) software such as selecting and opening a file, navigating and browsing the file contents, and responding to simple CAL instructions, was assessed.
- The data collection process involving MH students was conducted by one-to-one guidance with a staff member/teacher from the school who was familiar with the students to ensure consistency and validity of their answers. In addition, non-verbal cues provided by the students were used to help to verify the data accuracy. For students with visual impairments, the questionnaires were printed in large font. In cases where VI students were still unable to read the questionnaires, the fieldworker read the item aloud and ticked the response selected by the student. Similarly, in the case of physically handicapped students who were unable to fill in the questionnaire unaided, the fieldworker read the item aloud and ticked the response selected by the student.
- Individual interviews were conducted in addition to the focus group interviews with selected students so as to probe more deeply into their unique situations and needs,
- It was also found in the Pilot Study that the students with MH needed more prompts during the interview. Therefore the guidelines for student interviews were made more concrete and contextualized for students with different cognitive levels,
- Individual rather than focus group interviews were conducted with parents so as to gain a better understanding of their perceptions and views about ITEd with reference to the particular type of provision unique to the disabilities of their children, as well as how IT can help their children's daily lives and continual learning outside school.

The procedure for administering the Students' Questionnaire for students with ModMH or below was also adjusted to enable meaningful data to be collected while maintaining consistency in the data. This involved a further trial of the administration of the Students' Questionnaire to students of MH schools. In this further trial, five students were selected randomly from the MH schools, and the strategies to implement the questionnaire with these students were as follows:

1. Fieldwork staff members implemented the questionnaire with 5 students with MH of moderate grade (i.e. went through every question with all 5 students),
2. Fieldwork staff members clearly marked down and signified questions which could be and could not be answered by students themselves,
3. Fieldwork staff members turned to the teachers who were most familiar with the student (as a valid source of data) and marked down the questions which could be answered by teachers on behalf of the students,
4. From the results of the 5 students' questionnaires, decisions were made about which questions should be kept for students and which would be addressed to the teachers on their behalf,
5. In all subsequent administration of the Students' Questionnaire to students of MH schools in the Main Study, students were required to answer only those items that could be meaningfully answered by the students themselves as revealed in the further trial. Teachers who were most familiar with the particular student were invited to provide data on selected items on behalf of the students.

4.6 Procedure for conducting the fieldwork

4.6.1 Preparation for the fieldwork

Invitation letters from EMB and PolyU were sent out to 330 sampled schools to invite them to participate in the Study, with a detailed "Activity List" and "Information Sheet/Reply Form" for each school to explain their expected involvements in the Study in October 2003.

At the same time, another set of invitation letters from EMB and PolyU was sent to 839 "non-sampled" schools together with the School Heads' Questionnaires and a copy of their respective School IT Survey Form for the schools to update/verify their data in October 2003. For those schools which did not return the School IT Survey Form in the Initial Survey conducted in November 2002, a revised invitation letter was sent, together with a copy of the revised School IT Survey Form.

Regarding samples of the Activity lists, readers are invited to refer to Appendix VI.

4.6.2 Contact with the sampled schools

For all those schools selected for participating in School Visits, pre-visits were paid to every one of them by the Project Team to explain to the school heads/designated teachers, in person, the purpose of the Study, the details of their required involvement, the logistics and arrangements for administering the various research instruments. This helped to solicit their support for the Study.

For all other schools included in the sample, we made contact by phoning the school heads or the contact persons once we received their confirmation reply for accepting our invitation to participate in the Study. If needed, or when requested by schools, visits were also made to the schools to meet the school head/designated teachers personally to explain the details of the Study.

4.6.3 Conducting of the fieldwork

The actual fieldwork was conducted from early November 2003 to March 2004. A total of 330 sampled schools (150 primary schools, 150 secondary schools and 30 special schools) were included. (Please refer to Chapter 5 for the sampling strategy.) On all occasions, at least 2 fieldwork staff members worked in pairs to conduct the fieldwork. In collecting qualitative data via School Visits [which included classroom visits, focus group interview with students, school document analysis, and individual interviews with parents and students (Special Schools only)], at least a Principal Investigator, an Investigator, or a Senior Project Officer was in charge, and was supported by at least one Project Officer. The actual procedures for administering the various instruments were described in the sections concerning the respective instruments above.

For other ‘non-sampled’ schools where no fieldwork was required, the School Heads’ Questionnaire and the School IT Survey Form were sent to the school by mail. Follow-up phone calls were made to non-respondents within a week after the deadline for returning the forms.

4.7 Quality assurance procedures and guidelines

To ensure the quality of the data and findings of the Study, a number of quality assurance procedures were adopted, including:

- Training of fieldwork staff members: All fieldwork staff members received training on methods, procedures and interview techniques prior to the conducting of the fieldwork,
- Training manual: A manual detailing the rules and operational procedures of interviews was prepared and explained to each fieldwork staff member involved,
- Fieldwork supervision: Senior Project Officers were given the responsibility to supervise fieldwork staff members to ensure that the planned procedures were adhered to strictly,
- Post-enumeration check: 10% of returned questionnaires were re-checked by Senior Project Officers to ensure the accuracy of the data collected. Strict confidentiality was adhered to throughout the Study,
- Target response rate: The minimum response rate for “inside school” surveys was 90% and that for “outside school” surveys was specified as 70%,
- Data handling procedure: All data collected or used for the Study were handled according to the Personal Data (Privacy) Ordinance of the HKSAR Government. Data collected were regarded as confidential and will not be used for any purpose other than for this Study. The instruments (such as questionnaires) were not labeled with the actual name or identity of any individual respondent,
- Data check: All completed questionnaires were checked for completeness and problems uncovered were sent back to the fieldwork staff member for an explanation and/or correction. Strict confidentiality was observed throughout,
- Follow up on non-respondents: Non-respondents were followed up by telephone calls, and cases where problems needing clarification were spotted. Follow-up actions usually started one week after the start of the fieldwork and were then carried out concurrently with the fieldwork,
- Hotline and E-mail: The Hotline and the E-mail account, which were managed by administrative staff of the Project, served as a point of contact between the public (schools and parents) and the Project Team so that targeted populations could make appointments to schedule visits or interviews, ask questions, lodge complaints and verify Study personnel.

The consolidated views of the local and overseas consultants, and review team members on the appropriateness of the literature review, theoretical framework and methodology, as well as their observations and comments on the major findings and recommendations have been included in Appendices VII, VIII, and IX.

4.8 Data analysis methods

The data collected were analysed at three different levels:

1. School sector level, i.e. Secondary, Primary and Special: The unit of analysis is the school sectors. Schools and individuals were grouped by sector and summary statistics were presented. No attempts were made to compare across sectors, as they are different with respect to focus, missions, contexts and goals.
2. School level: The unit of analysis is the schools. At this level the analyses considered differences across schools, for example, in the general nature and pattern of use of IT by teachers in schools or the school-averaged performance of the students, and the factors contributing to these variations.
3. Individual student level: The unit of analysis is the individual students. Here the analyses focused on variations across students such as their attitude towards and competence and use of IT in learning related activities, and the investigation of important contextual factors that affect these variations.

The following section gives a more detailed description of the analyses that were carried out for each instrument.

4.8.1 Questionnaire Surveys

In order to address the Research Question sets, all of the important constructs pertinent to each question set were identified and the items from the various questionnaires relevant to the constructs were then mapped. Descriptive statistics such as means, standard deviations and frequency distributions were computed as appropriate to reveal the overall picture of ITEd implementation in Hong Kong. The methods of estimation of weighted means and percentage distributions are explained in Appendix X. Appropriate data were compared to the findings of the SITES-M1 and Preliminary Study to chart progress over the five-year period.

4.8.2 IT Literacy Assessment

There are two sections to the IT Literacy Assessment.

Section 1 is the assessment of students' stage-specific knowledge and skills in IT. These items were marked according to the model answers. A summary was computed of numbers of students by percentage of correct answers. To examine the extent to which the students had met the criterion-based expectations of IT targets on this section of the assessment, three categories of indicator were used: those who were able to answer less than 50% of the items correctly, those who were able to answer from 50% to 80% of the items correctly and those who were able to answer more than 80% correctly. Students who scored above 80% were considered to have complete mastery of the stage-specific knowledge and skills, since, as mentioned earlier, a 20% tolerance level was set up to allow for random variation which may affect the test score from a variety of sources, such as distractions in the assessment environment, the occasion of testing, the rater, the examinee's state of mind at the time of testing, etc. Those who scored from 50% to 80% were considered to have at least a reasonable grasp. At school level, summaries were made regarding percentage of students meeting this criterion by school.

Section 2 of the IT Literacy Assessment is the students' self-assessment of their IT literacy. Frequency distributions of the students' responses to the items were produced.

The method for computing the percentage distributions is included in Appendix X.

4.8.3 School Visits

The most important purpose for the analyses of the School Visit data was to identify unique uses and good practices that were of interest for further investigation. Fieldworkers made independent observations and records and reached consensus about these as a form of triangulation of the data during the post-visit debriefing. The methods of analysis of the data collected are explained below.

School Tour

Fieldwork staff members recorded their observations on the School Tour Observation Form. Some numerical data were analysed descriptively (e.g. frequency counts) to identify aspects of the school IT infrastructure, access and actual usage (for example, number of computers or peripherals). Field notes about their observations of IT utilisation in class and outside class and the feeling that there was an IT culture in the school were treated as qualitative data and were analysed using the procedures for qualitative data as described in Section 4.8.4 below.

School Document Analysis

Observations were recorded on pre-prepared forms. These notes were treated as qualitative data, as described in Section 4.8.4.

Classroom Visit

The major target for the analyses of classroom visit data was to identify innovative practices in the classroom and to make inferences about the effects on teaching and learning, particularly on students' reactions. In the post-lesson de-briefing, the observers reflected on their observations of the pedagogical practices and learning outcomes (as defined for the purpose of this Study in Chapter 3, for example teacher-centredness, extent of IT use and how it relates to the pedagogical paradigm of IT, the extent of students' motivation, understanding and participation) and came to a mutual consensus through discussion about the classroom practices and the perceived impact of these pedagogical practices of using IT. These reflections were treated as qualitative data and were analysed using the procedures for qualitative data, as described in Section 4.8.4. The Analysis Framework for Classroom Visit is attached in Appendix XI. Specific cases and examples of interest were drawn on to illustrate points emerging from these analyses.

IT Activity Daily Log

The purpose of the IT Activity Daily Log was to measure students' habits, usage patterns, perceived importance, satisfaction and self-efficacy in using IT. Therefore the first part of the analysis was to calculate the means of total time spent with respect to activities, tools, physical location and activities related to school curriculum subjects.

The second part of the analysis considered the students' ratings of various IT-related activities in terms of importance, interest and self-efficacy. These ratings were weighted with respect to the time the student actually spent on the respective activities, and then averaged to indicate their overall perceived importance, interest and self-efficacy with respect to each category of activities they had engaged in.

The method for estimating the weighted means of students' responses is included in Appendix X.

Focus Group Interviews and Individual Interviews

The interviews were transcribed and the transcripts of the individual interviews were sent to the respective interviewees for verification, when appropriate. They were then analysed according to standard protocols for the analyses of qualitative data, as described in Section 4.8.4.

EMB Document Analysis

Four aims were identified for the analysis of the EMB documents:

- to identify specific targets/objectives of the ITEd initiative,
- to chart progress and changes in the utilisation of resources,
- to evaluate reports of major projects,
- to explain the funding model for the ITEd initiative.

The documents were classified according to categories based on the research question sets and the relevant documents were analysed systematically in order to address these issues. The framework for analysis of EMB Documents is attached in Appendix V.

Triangulation of data

In the data analysis process, data from different sources were triangulated with each other so as to ensure the validity of interpretation of and the conclusions drawn from the data. The following strategies were used to facilitate triangulation of the data:

- The use of a variety of data sources, such as data from different stakeholders and/or instruments within the school sector,
- The use of multiple research methods, that is quantitative and qualitative, to compare data, such as between Student Focus Group interview and IT Activity Daily Log,
- The use of more than one expert researcher within the research team and/or local, overseas consultants.

The triangulation took the form of checking the consistency of the data collected from different stakeholder groups or via different methods, and/or obtaining agreement between investigators about the analysis and interpretation of the data.

4.8.4 Description of qualitative analysis processes

Qualitative data analysis is the process of systematically arranging and presenting information in order to search for meaning in the data collected (Minichiello et al., 1995). The analysis of qualitative data involves three distinct stages which have been followed strictly in the present study:

- Data reduction and display,
- Identifying “themes” or patterns from data collected,
- Drawing conclusions from the data.

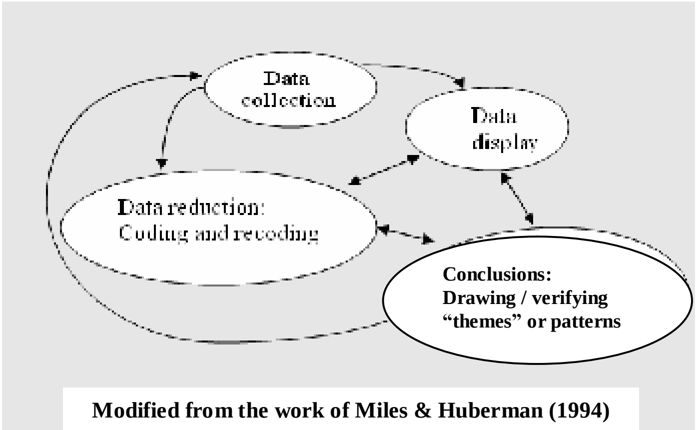


Figure 4.2 Interactive model of analysing qualitative data (Modified from the work of Miles & Huberman, 1994)

To analyse the qualitative interview and observation data, content analysis was used to identify and categorise the Primary "themes" or patterns in data collected (Patton, 1990). This was combined with the constant comparative method, in which incoming data were constantly compared for patterned regularities against the previous data. It is important to note here that the themes or patterns emerge out of the data rather than being imposed on them prior to data collection and data analysis (Patton, 1990).

Steps involved in qualitative data analysis

- Note-taking and tape-recording (for interviews); note-taking and recording on prepared forms (for observations, classroom visits),
- Verbatim transcription of tape-recorded interviews (in the language in which the interview was conducted); verification by interviewees of individual interviews,
- Coding and recoding (for all data including interview transcripts, observation notes and forms, questionnaire open comments, and relevant school documents),
- Drawing/verifying "themes" or patterns: Identification of categories of data specific to the instrument used and common across instrument,
- As appropriate, some descriptive statistics pertaining to frequency of incidents pertaining to specific themes,
- Identification of specific quotations to support or illustrate the patterns, and translation of these quotations into English where the transcript was in Chinese.

To ensure consistency, at least two fieldwork staff members made independent observations and compared these during the post-observation briefing.

It must be emphasized that the purpose of the description of proposed data analysis was to give a sense of the direction and proper protocols rather than details of the actual variables that were analysed. This is appropriate for the phenomonographical approach used in the qualitative part of this Study, in which the role of the researcher is:

> *'noting regularities, patterns, explanations, possible configurations, causal flows, and propositions. The competent researcher holds these conclusions lightly, maintaining openness and skepticism, but the conclusions are still there, inchoate and vague at first, then increasingly explicit and grounded….qualitative data analysis is a continuous, iterative enterprise…. Qualitative researchers are in a more fluid – and a more pioneering – position' (Miles and Huberman, 1994, p.11).*

4.9 Limitations of the Study

It must be pointed out that the present study has a number of limitations, which have seriously affected the methodology, instrumentation and logistical arrangement of the study. While these factors have been taken into consideration as much as possible in the design of the Study they have nevertheless had some impact on the validity and reliability of the results, therefore it is necessary to consider the findings in context and interpret them with caution.

- First, when the IT in education initiatives were launched in 1998, no attempt was made to establish a control group or baseline measures of important process or outcome indicators of student learning. It is therefore difficult for the present study, in the form of a cross-sectional study conducted 5 years later, to draw ***unambiguous*** and ***definitive*** conclusions about the impact of the IT in education initiatives on the teaching and learning process, or changes in students' achievement or learning outcomes as a result of the initiatives over the past five years. The Project Team has drawn on some earlier data from the Preliminary Study and SITES-M1 Study that have enabled some comparisons to be made over time. However, it must be noted that these studies have all used different sampling schemes and different instrumentation so the results, while useful, are not directly comparable.
- The difficulties associated with attempts at international benchmarking, such as differences in missions, goals, context and environment, cultural backgrounds, etc. as well as the lack of internationally accepted standards and measures of IT learning outcomes impose restrictions on the scope of this Study to compare the Hong Kong context accurately with the situations of ITEd in other countries. Comparisons are also dependent upon the availability of appropriate comparative data at the time of report writing. Instead it necessitates that the comparison of ITEd initiatives in Hong Kong with other countries be done in a qualitative and subjective way.
- The Project Team attempted to use a wide range of quantitative and qualitative methods and instruments for data collection. However, it should be noted that each method and instrument has its uniqueness and usefulness, but at the same time its limitations. For example, focus group interview can afford to probe deeply into the respondents' thoughts and beliefs and generate useful qualitative information, but the findings may not be highly representative because of the small sample. On the other hand, findings from a structured questionnaire survey done according to a proper sampling scheme can be representative of the population studied, but the questionnaire cannot be very long due to practical considerations. Each of the methods and instruments serves a unique purpose and role, and they must be viewed together to have a complete picture of the overall design of the Study.
- Another difficulty is the short time-span available for the conducting of the Overall Study. During a very short period following approval of the Project Plan it has been necessary to conduct a Pilot Study to test the research methodology and instruments designed, as well as to rehearse the logistics and to trial run the instruments to uncover any possible areas for improvement and to refine the research methodology and instruments in consultation with the EMB based on the outcomes of the Pilot Study as well as to carry out the Main Study. This timeframe caused the data collection to fall at a time that was interrupted with holidays, which caused some delays in receiving responses from some schools that could not be followed up until after the holidays. This in turn cut into the time available for data analysis, so the whole project was run within an extremely tight timeframe that has inevitably affected the depth of analysis and reporting possible.
- This is a very large-scale study covering three school sectors, over a thousand schools involving more than ten thousand each of teachers and students, and incorporating data collected from parents and community stakeholders as well as schools. The magnitude of this data has necessitated a compromise between breadth and depth of coverage, and it has not been feasible to delve as deeply into each research question as could have been done with a more focused study.
- As indicated in the Literature Review (Chapter 2), some research has found that it can take a minimum of five years for effective change to be implemented in the use of IT in education (Dwyers et al., 1990; Newhouse, 1999). Since it is only now five years since the implementation of the ITEd initiatives, it may still be too early to assess 'long-term impact'.

- It is important to note that much of the data collected for this Study were based on participants' perceptions and self reporting, particularly with respect to impacts and outcomes of IT use. This kind of data is inevitably limiting to the validity and reliability of the outcomes. In fact, there may be some discrepancy between what people think and what they do, and between what they think they can do and what they actually can do. The Project Team has attempted to address this limitation by collecting qualitative data for triangulation purposes. Nevertheless, it is still an unavoidable problem.
- Similarly, it has been difficult in a study of this magnitude to include the best kinds of instruments to measure student learning outcomes, given the large sample size and the quantity of instruments the respondents needed to complete. The IT Literacy Assessment (Section 1) was developed as an attempt to give some measure of learning outcomes within these constraints. However, this is essentially an objective test and has no task-based component. It is therefore only able to measure IT knowledge and to some extent computer literacy and IT skills, and has not been able to address other outcomes including higher-order thinking skills, hence limiting the usefulness of the data for assessing the impact of IT.
- The classroom visit was the activity about which the teachers were most concerned. From the students' reactions and the teachers' carefulness in planning, there were signs that the class visit was intrusive to a certain extent. As result, it might be that what the research team observed was not what happened in the 'natural' classes. Instead, the "best" performance (in the teacher's perspectives) demonstrated by the teacher was observed. The Project Team attempted to address this by explaining the aims and objectives of the study clearly to the teacher before the class visit to ensure that the teacher understood the purpose of the visit was not to assess the teacher's performance, but to collect data about the common use of IT for teaching and learning and the students' reactions in schools. Attempts were also made to convince the teacher that no special preparation needed to be made so as to discourage them from putting on a 'show' and to reduce the burden on the teacher. Furthermore, during classroom visits, observers took every possible method to minimise the effects of their presence, such as sitting at the back of the room and engaging in non-participant observation. The fact that a significant proportion of the lessons observed had no or very little IT components in them suggests that teachers, at least a large proportion of them, had not tried to 'stage a show' specifically for the observation. Nevertheless, it was undeniable that some teachers were only using IT because of the observation and it did not necessarily reflect their usual practices. Therefore, it must be borne in mind in interpreting the results that, due to its intrusive nature, the instrument can at most find out how IT can be *best used* in the classrooms.

4.10 Notes about reporting of data

The next chapter will describe the sampling and response rates for the Overall Study, then Chapters 6 to 9 will present the results of the data analyses for the Primary, Secondary and Special School Sectors. The full sets of tables summarising the percentage distributions and other relevant statistics are included in Appendices XII, XIII and XIV for the Primary, Secondary and Special School Sectors respectively. The following notes are applicable throughout these latter four chapters.

- The percentage figures presented in the chapters and corresponding appendices have been rounded to one decimal place. Consequently, due to this rounding, total figures in tables might not be exactly 100%.
- Unless otherwise stated, N refers to the total number of valid responses.
- Unless otherwise stated, M refers to mean and SD and SE to standard deviation and standard error respectively.

Chapter 5 Sampling and Response Rates

5.1 Use of Initial Survey results for sampling stratification

As mentioned in Section 4.4.1, the Initial Survey was conducted in November 2002 to collect information on IT progress in each school for subsequent sampling stratification in the Overall Study.

In the Initial Survey, basic information for individual schools on the four domains as spelled out in the *Five-Year Strategy*, namely *Access and Connectivity, Teacher Enablement, Curriculum and Resource Support*, and *Community-wide Culture* was collected. Composite IT progress scores were then computed for each of the schools by aggregating the individual school's scores on items pertinent to the above mentioned domains. The distribution of schools in terms of their composite IT scores was identified, which provided a frame for stratifying schools according to their IT progress.

5.2 Sampling scheme for schools to be included in the Main Study

After the Pilot Study, EMB advised the PolyU Project Team to exclude all DSS (as at 2002/03 school year) schools in the Main Study, and thus the scores of these schools were not included in the IT score computation. Moreover, EMB and the PolyU Project Team also agreed that, based on the Initial Survey results, Primary and Secondary schools would be stratified into three strata (instead of 5 strata as in the Pilot Study) according to the schools' composite IT progress scores derived from the Initial Survey. Those that did not return their questionnaires or did not provide enough information for stratification in the Initial Survey were allocated to the fourth stratum.

In the beginning of the 2003/04 academic year, some changes occurred due to primary schools being closed down or being merged with others. As a result, the number of primary schools that were covered in the Overall Study was reduced from 698 to 684 while the numbers of other types of schools remained unchanged.

An estimated target response rate of about 80% for schools was aimed for, and the sampling scheme should allow a grossing-up of sample sizes according to this target response rate. The actual stratum sample sizes for primary and secondary schools that were adopted in the Main Study are given in the following table. The number of schools was drawn from each stratum according to the corresponding grossed up sample size.

Table 5.1: Number of primary schools and secondary schools for the Main Study

Stratum	Primary			Secondary		
	Number of schools	Effective sample size	Grossed up sample size	Number of schools	Effective sample size	Grossed up sample size
1	209	36	44	118	37	45
2	249	31	38	140	37	45
3	206	43	53	120	37	45
4	20	10	15	35	10	15
Total	684	120	150	413	121	150

Among these selected schools, 6 were drawn from each of stratum 1, 2 and 3, and 2 from stratum 4 for more in in-depth study such as school tour and classroom observation. In other words, a total of 20 schools from primary and 20 schools from secondary were chosen for more in-depth study.

Special schools were stratified by the type of disability they cater for, as shown in Table 5.2. A grossing-up according to about 80% target response rate gives the grossed-up sample sizes in the last column.

Table 5.2: Breakdown of special school sample by type of disability

Type	Number of schools	Effective sample size	Grossed up sample size
Mildly and Moderately Mentally Handicapped (MmodMH)	7	3	4
Mildly Mentally Handicapped (MMH)	10	3	4
Moderately Mentally Handicapped (ModMH)	14	3	4
Severely Mentally Handicapped (SMH)	10	3	4
Physically Handicapped (PH)	7	2	2
Hospital (H) [a]	1[a]	1	1
School for Social Development (SD)	7	3	4
Hearing Impaired (HI)	4	2	2
Visually Impaired (VI) [b]	1[b]	1	1
Skill Opportunity School (SOS)	7	2	2
Practical School (PS)	4	2	2
Total	72	25	30

(a) The sampling among hospital schools (H) was treated separately. Since students stay in hospitals, they may be considered as different classrooms of one school. After consultation with EMB, it was agreed to stratify hospital schools into two strata. After grossing-up, the Overall Study covered 5 hospitals. According to EMB's advice, 16 (instead of 17 hospital schools) have been included for the Overall Study, as the excluded one does not provide regular hospital school services. Among the 16 schools, 3 schools have more than one type of wards and they were all invited to take part in the Overall Study (that is, 'administrative classification'). In the remaining 13 schools with only one type of ward, 2 hospital schools were selected randomly.

(b) of the two VI schools, one VI school has been excluded from the Overall Study because of its small student population and students there are visually impaired and mentally handicapped.

In the hospital schools only long-stay students were targeted. It was agreed that only those students who had stayed in the hospital for seven days or more at the time of fieldwork would be covered in the Main Study.

5.3 Sampling scheme for target participants for the Overall Study

Six target groups were covered in the Overall Study, namely,

(1) School heads
(2) School IT team members who are teachers
(3) All teachers who are not IT team members (including specialists and therapists in Special Schools)
(4) Students
(5) Parents
(6) Other stakeholders (for Focus Group/Individual Interview).

Groups 1 to 5 are school-related, whereas group 6 covers a wide spectrum of personnel from schools and the community at large.

School heads

After consultation with EMB, it was agreed that school heads are amongst the most important leaders in promoting and implementing ITEd initiatives at school level. Hence the Project Team decided to survey all school heads via questionnaires. This means that all of the 684 primary school heads, 413 secondary school heads and 72 special school heads were surveyed by questionnaires.

IT team members

All school IT team members who are teachers from those schools selected for the Main Study were included. A self-administered Teacher Questionnaire and an IT Team Member Questionnaire were used to collect the views of these teachers. Assuming an average of 4 IT team members per school, the estimated sample size was around 1,320 (4×150 Primary Schools, 4×150 Secondary Schools and 4×30 Special Schools).

Other teachers/specialists/therapists

All teachers/specialists/therapists from those schools selected for the Main Study who are not IT Team members were surveyed by the self-administered Teacher/Specialist/Therapist Questionnaire. Assuming that there were 36 such teachers in each primary school, 36 teachers/specialists/therapists in each special school, and 51 teachers in each secondary school, the total sample size for this target group was estimated at around 14,130 teachers/specialists/therapists.

Students and parents

It was agreed that only Primary 3 and Primary 6 needed to be surveyed since these two levels could represent the lower and upper Primary as key stages. Two classes were selected randomly from each of P3 and P6 levels for each primary school included in the Study. Eleven students were selected randomly from each class for guided completion of the questionnaire. Among these students, a quarter was sampled further to take the IT Literacy Assessment. This sampling scheme covered 6,600 Primary students [11 (students) $\times$ 4 (classes) $\times$ 150 (schools)] for questionnaire survey and 1,650 Primary students for the IT Literacy Assessment. 220 students were selected for the IT Activity Daily Log. For all those students who were selected for IT Literacy Assessment, their parents were selected for a self-administered questionnaire survey. Thus, a total of 1,650 parents were invited to complete the questionnaire survey.

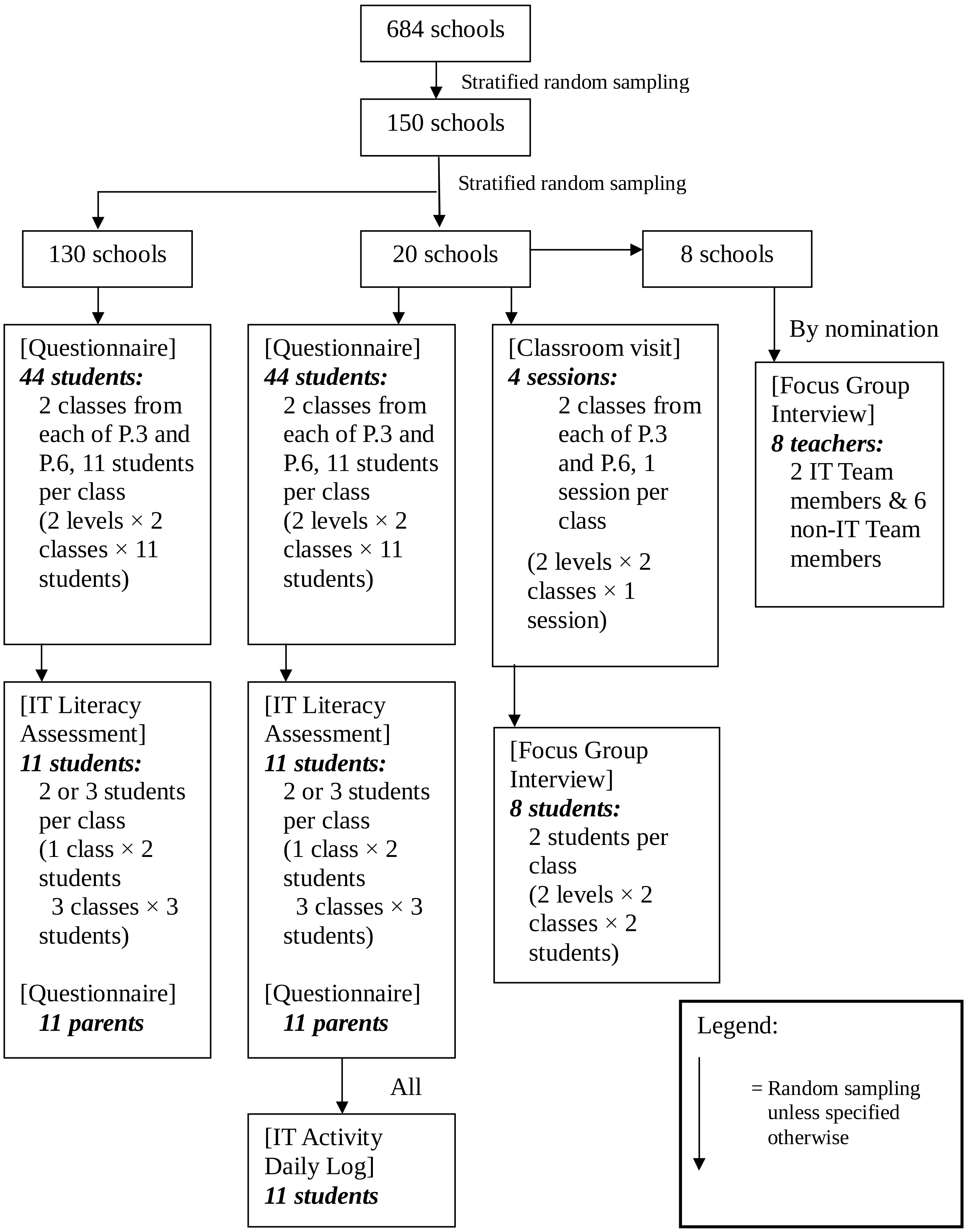


Figure 5.1: Summary of the sampling scheme for primary school in the Main Study

For the Secondary Schools, two classes were selected randomly from each of S2, S4 and S6 levels for each Secondary School included in the Study. Nine students were selected randomly from each class for guided completion of the questionnaire. This gave a maximum total of 8,100 Secondary students being sampled [9 (students) $\times$ 6 (classes) $\times$ 150 (schools)] for the questionnaire survey.

Among those students selected for the questionnaire surveys, around a quarter were selected randomly to take the IT Literacy Assessment. This sampling scheme covered 2,100 students. 280 students were selected to complete the IT Activity Daily Log and 2,100 parents were selected for the parent questionnaire.

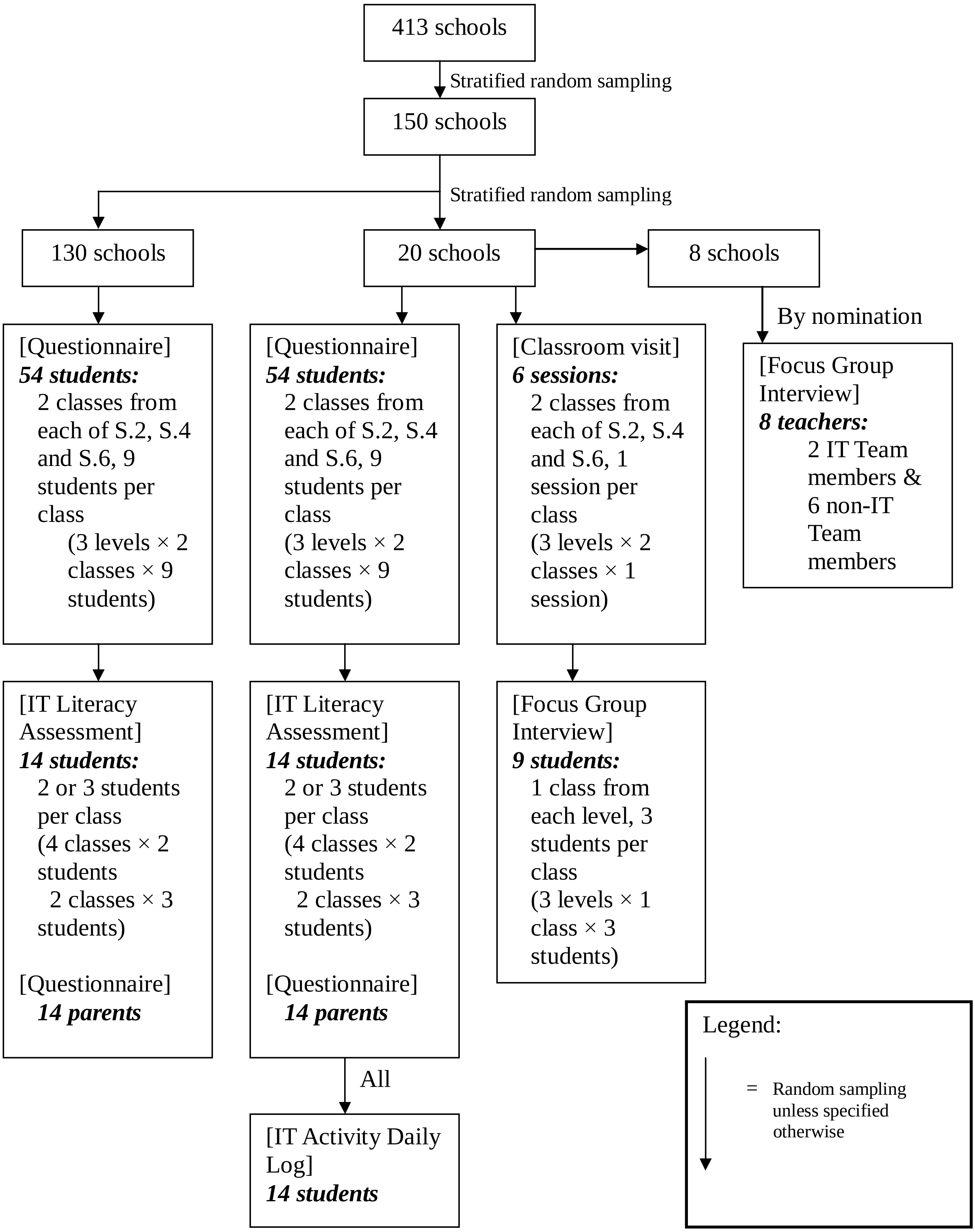
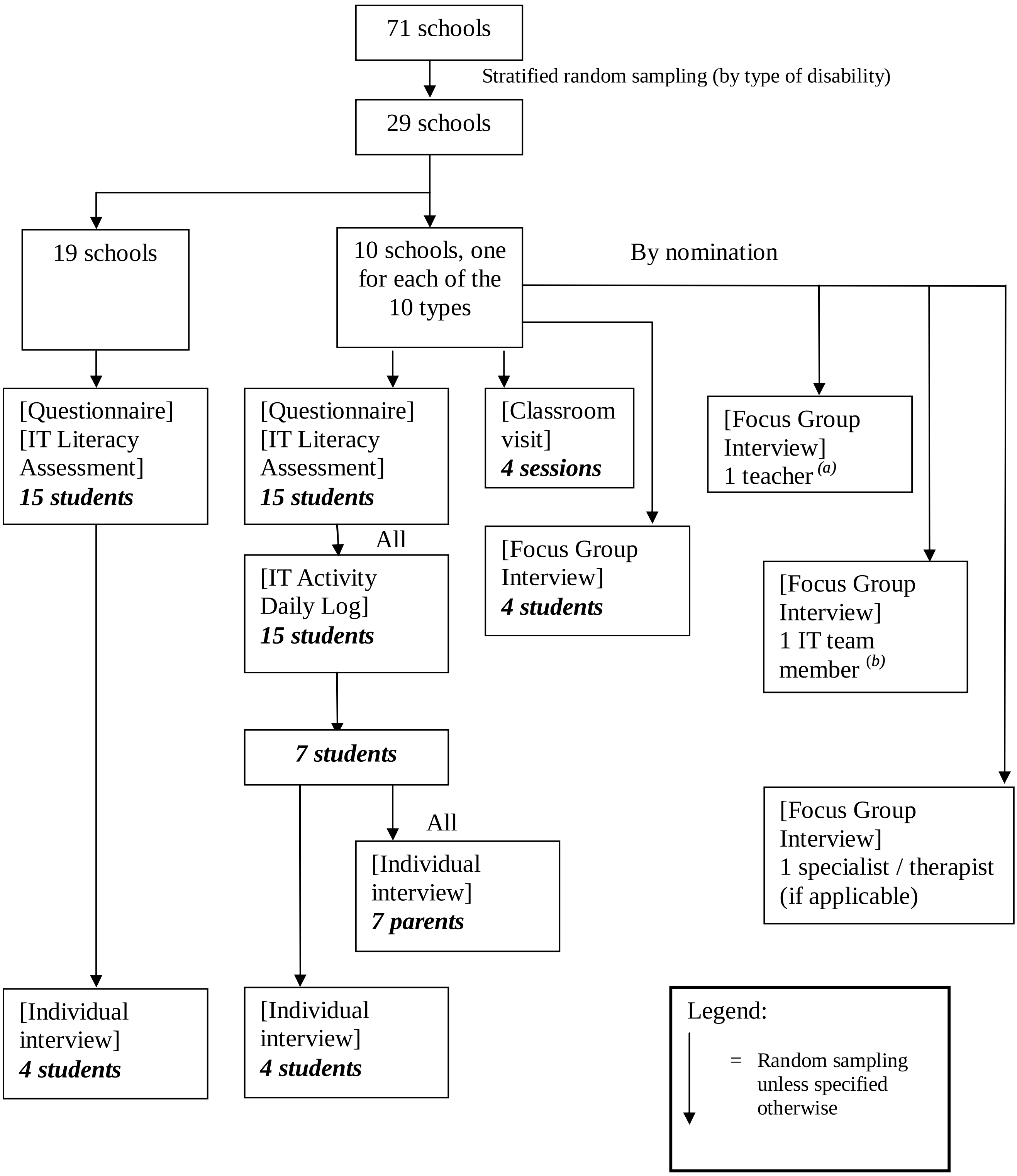


Figure 5.2: Summary of the sampling scheme for secondary schools in the Main Study

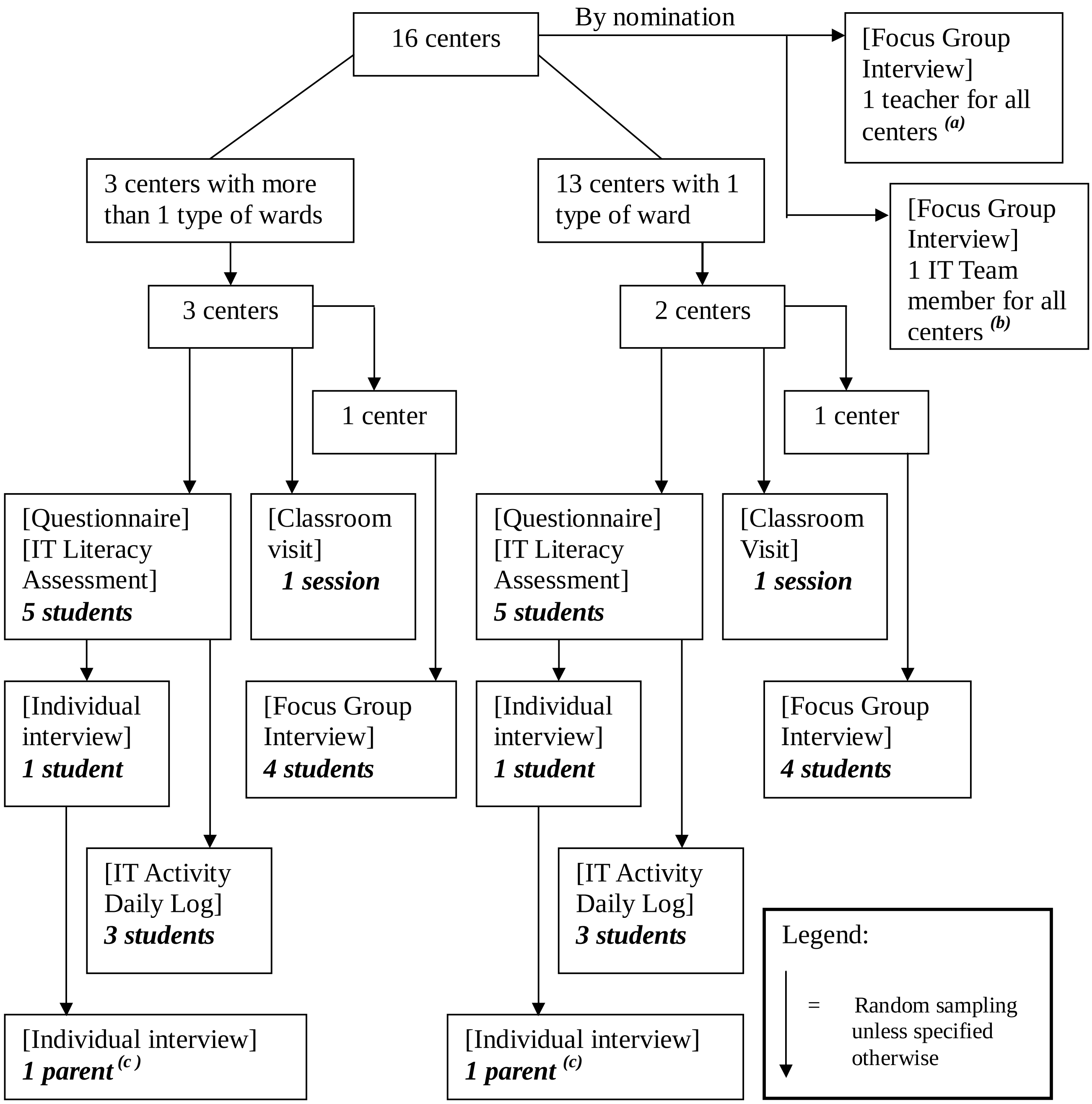
For the Special Schools, 15 students per school were selected randomly. A total of 460 students [15 (students) × 29 (schools) + 5 (students) × 5 (hospital school centers)] were invited to complete the questionnaire and the IT Literacy Assessment, which were guided by an interviewer. Four students randomly selected from the above group were further invited to attend an Individual Interview. A total of 121 students (4 students × 29 schools + 1 student × 5 hospital school centers) were covered in the Individual Interviews. 165 students (15 students × 11 schools) were selected for the IT Activity Daily Log. Seven parents per school type were drawn randomly from amongst the selected students of a Special School to participate in-individual interviews. The total number of parents interviewed was 77.

Fig. 5.3 summaries the sampling scheme for Special School in the Main Study (excluding hospital schools).



(a) Focus group interview was conducted for teachers nominated by 10 schools selected for more in-depth study, as well as from one hospital school (Hong Kong Red Cross Hospital School)
(b) Focus group interview was conducted for IT team members nominated by 10 schools selected for more in-depth study as well as from one hospital school (Hong Kong Red Cross Hospital School)

Figure 5.3: Summary of the sampling scheme for special school (excluding hospital schools) in the Main Study



(a) Focus group interview was conducted for teachers nominated by 10 schools selected for more in-depth study, as well as from one hospital school (Hong Kong Red Cross Hospital School)

(b) Focus group interview was conducted for IT team members nominated by 10 schools selected for more in-depth study as well as from one hospital school (Hong Kong Red Cross Hospital School)

(c) Altogether 7 parents were selected for Individual Interviews, i.e. one parent from each of the 5 selected students for individual-interviews, and one parent from the remaining 4 selected students for accomplishing [Questionnaire]was selected randomly from the "3 centers with more than 1 type of wards" and from the "2 centers with 1 type of ward".

Figure 5.4: Summary of the sampling scheme for special school (hospital schools) in the Main Study

The estimated sample sizes for the various instruments by school sectors are shown in Tables 5.3, 5.4 and 5.5 below.

Table 5.3: Estimated sample size for the various instruments for Primary Schools in Overall Study

Subject groups	Instruments	Estimated Sample size 150 schools
Students	Students' Questionnaire	6,600 students (22 from P3, 22 from P6: 11 students x 4 classes × 150 schools)
	IT Literacy Assessment	1,650 students (randomly select one fourth of the sample selected for Questionnaire)
	School Visit	20 schools
	Classroom Visit	80 sessions (2 sessions for P3 and 2 for P6: 2×2×20)
	IT Activity Daily Log	220 students (11 students with 5 or 6 from P3 and P6, for those 20 schools selected for school visit, 11 × 20)
	Focus Group Interview	160 students (20 groups, each group comprising 8 students, 4 from P.3 and 4 from P.6)
Teachers	Teachers' Questionnaire	6,000 teachers (40 × 150 schools)
	IT Team Members' Questionnaire	600 IT team members (4×150 schools)
	Focus Group Interview	80 teachers (2 groups conducted in Pilot Study and 8 groups conducted in Main Study; each group comprising 2 IT Team members, 6 non-IT Team members from the same school)
	School Visit	20 schools
	Classroom Visit	80 sessions (same sessions as those for students above) (2 sessions for P3 and 2 for P6)
School Heads	School Heads' Questionnaire	684 school heads (All school heads)
	Individual Interview	10 school heads (2 individual interview conducted in Pilot Study and 8 individual interview conducted in Main Study)
Parents	Parents' Questionnaire	1,650 parents (all parents of those students selected for IT Literacy Assessment)

Table 5.4: Estimated sample size for the various instruments for Secondary Schools in Overall Study

Subject groups	Instruments	Estimated Sample size (150 schools)
Students	Students' Questionnaire	8,100 students (18 from S2, 18 from S4, 18 from S6: 9 students × 6 classes × 150 schools)
	IT Literacy Assessment	2,100 students (around a quarter of the students chosen for questionnaire: 14 students × 150 schools)
	School Visits	20 schools
	Classroom Visit	120 sessions (2 sessions for S2, 2 for S4 and 2 for S6: 2 × 3 × 20)
	IT Activity Daily Log	280 students (14 students with 4 or 5 from S2, S4 and S6 for those 20 schools selected for school visit,: 14 × 20)
	Focus Group Interview	180 students (20 groups, each group comprising 9 students, 3 from S2, 3 from S4 and 3 from S6 in the same school)
Teachers	Teachers' Questionnaire	8,250 teachers (55 teachers × 150 schools)
	IT Team Members' Questionnaire	600 IT Team members (4 IT Team members × 150 schools)
	Focus Group Interview	80 teachers (2 groups conducted in Pilot Study and 8 groups conducted in Main Study; each group comprising 2 IT Team members, 6 non- IT Team members from the same school)
	School Visit	20 schools
	Classroom Visit	120 sessions (same sessions as those for students above) (2 sessions for S2, 2 for S4 and 2 for S6)
School Heads	School Heads' Questionnaire	413 school heads (All school heads)
	Individual Interview	10 school heads (2 individual interview conducted in Pilot Study and 8 individual interview conducted in Main Study)
Parents	Parents' Questionnaire	2,100 parents (all parents of those students who have been selected for IT Literacy Assessment)

Table 5.5: Estimated sample size for the various instruments for Special Schools in Overall Study

Subject groups	Instruments	Estimated Sample size (30 schools)
Students	Students' Questionnaire	460 students (15 students × 29 school + 5 students × 5 hospital school centers)
	IT Literacy Assessment	460 students (same as those selected for Questionnaire)
	IT Activity Daily Log	165 students (15 students × 11 schools, 1 school per school type)
	School Visit	11 schools
	Classroom Visit	45 sessions
	Individual Interview	121 students (4 students × 29 schools + 1 student × 5 hospital school centers)
	Focus Group Interview	48 students (4 students per school: 4 × 10 schools + 4 × 2 hospital school centers)
Teachers/ Specialists/ Therapists	Teachers'/ Specialists'/ Therapists' Questionnaire	1,200 teachers (40 teachers/specialists/therapists × 30 school)
	IT Team Members' Questionnaire	120 IT Team members (4 IT team members × 30 schools)
	Focus Group Interview [(a)]	5 teachers/IT team members and 5 specialists/therapist were invited to participate in the Pilot Study 11 teachers, 11 IT team members, and 11 specialists/therapists were invited to participate in the Main Study
	School Visit	11 schools (one school from each school type)
	Classroom Visit	45 sessions
School heads	School Heads' Questionnaire	72 school heads (All school heads)
	Focus Group Interview [(a)]	16 school heads (5 school heads were invited to participate in the Pilot Study and 11 school heads were invited to participate in the Main Study)
Parents	Individual Interview	77 parents (7 parents from each school, one school per school type: 7 × 11 school types)

(a) No of participants for each focus group interview was around 4-8.

Table 5.6: Summary of the estimated number of responses per instrument set to be collected per target group in the Overall Study

Stakeholder groups	**Primary School Sector**	**Secondary School Sector**	**Special School Sector**
Quantitative Instruments			
School Heads' Questionnaire	684	413	72
Teachers'/Specialists'/Therapists' Questionnaire	6,000	8,250	1,200
IT Team Members' Questionnaire	600	600	120
Parents' Questionnaire	1,650	2,100	N/A
Students' Guided Questionnaire	6,600	8,100	460
IT Literacy Assessment	1,650	2,100	460
IT Activity Daily Log	220	280	165
Qualitative Instruments			
School Heads Individual Interview	10	10	N/A
School Heads Focus Group Interview	N/A	N/A	2-3 groups (5 school heads in the Pilot Study, and 11 school heads in the Main Study)
Teachers/IT Team Members/ Specialists/Therapists Focus Group Interview	10 groups (80 teachers/IT Team Members)	10 groups (80 teachers/IT Team Members)	7-8 groups (5 teachers/IT team members and 5 specialists/therapist were invited to participate in the Pilot Study; 11 teachers, 11 IT team members, and 11 specialists/therapists were invited to participate in the Main Study)
Students Focus Group Interview	20 groups (160 students)	20 groups (180 students)	12 groups (48 students)
Individual Interview- Students	N/A	N/A	121
Individual Interview- Parents	N/A	N/A	77
School Visit	20	20	11
Classroom Visit	80	120	45

5.4 Definition of sampled schools and non-sampled schools

Throughout this Report the terms 'sampled' and 'non-sampled' schools have been used. The following is an explanation of these terms as they have been defined for the purpose of this Study.

Primary school sector

There is a total of 684 schools in this sector. According to the sampling stratification/methodology, 150 schools were selected for doing either Type 1, 2 or 3:

Table 5.7: Type of activities for Primary and Secondary School Sectors

Type of Activity	Activities
Type 1	- School (IT) Survey Form (complete/update) - Questionnaire Survey (School Head, Teachers, IT Team Members, Students, and Parents) - IT Literacy Assessment
Type 2	- School (IT) Survey Form (complete/update) - Questionnaire Survey (School Head, Teachers, IT Team Members, Students, and Parents) - IT Literacy Assessment - IT Activity Daily Log - Classroom Visit - Focus Group Interviews with students - School Visit (School Tour, School Document Analysis)
Type 3	- School (IT) Survey Form (complete/update) - Questionnaire Survey (School Head, Teachers, IT Team Members, Students, and Parents) - IT Literacy Assessment - IT Activity Daily Log - Classroom Visit - Focus Group Interviews with students - School Visit (School Tour, School Document Analysis) - Focus Group Interview (Teachers/IT Team Members) - Individual Interview with School Head

130 schools were selected for Type 1 activities, 12 schools for Type 2 activities, and 8 schools for Type 3 activities. These 150 schools are regarded as sampled schools and the remaining 534 are termed as non-sampled schools. These latter schools were asked to complete/update the School Information Technology Form and the School Heads' Questionnaire.

Secondary school sector

Of the 413 secondary schools in Hong Kong, 150 sampled schools were selected, of which 130 schools were for Type 1 activities, 12 schools for Type 2 activities, and 8 schools for Type 3 activities. The remaining 263 schools are considered as non-sampled schools in the same manner as described above for the Primary School Sector.

Special school sector

Of the 72 Special Schools in Hong Kong, 30 schools were selected for doing the two types of activities as described in Table 5.8.

Table 5.8: Type of activities for Special School Sector

Type of Activity	Activities
Type 1	1. School (IT) Survey Form (complete/update) 2. Questionnaire Survey (School Head, Teachers, IT Team Members, Specialist/Therapists, and Students) 3. IT Literacy Assessment 4. Individual Interviews for Students
Type 2	1. School (IT) Survey Form (complete/update) 2. Questionnaire Survey (School Head, Teachers, IT Team Members, Specialists/Therapists, and Students) 3. IT Literacy Assessment 4. Individual Interviews for Students 5. Individual Interviews for Parents 6. IT Activity Daily Log 7. Classroom Visit 8. Focus Group Interviews with students, teachers, IT Team Members, Specialists/Therapists, School Heads 9. School Visit (School Tour, School Document Analysis)

19 schools were selected for Type 1 activities, and 11 schools for Type 2 activities. These 30 schools are regarded as sampled schools and the remaining 42 are termed as non-sampled schools. These latter schools were asked to complete/update only the School Information Technology Form and the School Heads' Questionnaire.

To summarize, there are 330 sampled schools in the Overall Study (150 primary schools, 150 secondary schools and 30 special schools) and 839 non-sampled schools (534 primary schools, 263 secondary schools and 42 special schools).

5.5 Response rates by school sector

The cut-off date for data collection of the Overall Study was 7 May 2004. According to the approved Project Plan, the required response rate for "inside school" surveys was 90%, which included school (IT) survey, questionnaire to school heads, teachers, IT team members, specialists/therapists and students, IT Literacy Assessment, and IT Activity Daily Log. For "outside school" surveys, which included questionnaires to parents, the required response rate was 70%. The required response rate is only applicable to quantitative instruments, but not to qualitative instruments. Achieving the target response rate is important for a quantitative survey where generalization to a target population is the intent. However, for a qualitative study it is not so important since this type of study does not aim to generalize the information collected to a wider population. The following sections give an account of response rates by school sector.

5.5.1 Primary school sector

Table 5.9 gives a summary of the number of "sampled" schools per stratum/activity type for the primary school sector:

Table 5.9: Summary of number of returns of "sampled schools" per stratum/activity type

Activity Type	Stratum 1	Stratum 2	Stratum 3	Stratum 4	No. of returns of sampled schools
Type 1 only	32	25	39	8	104
Type 2 only	4	3	4	1	12
Type 3	2	3	2	1	8
Total	38	31	45	10	124

All school heads of the 684 primary schools were invited to complete the *School Heads' questionnaires*, and to complete/update the *School (IT) Survey Form*. The total number of and the response rates for these two instruments in the Main Study were reported in Table 5.10

Table 5.10: Response rate of School Heads' Questionnaire and School (IT) Survey Form for primary school sector in the Main Study

Instrument	No. Included in Sample	No. of Returns	Response Rate
School Heads' Questionnaire	684	625	91%
School (IT) Survey Forms (update/complete)	684	616	90%

Totally 124 sampled primary schools participated in either type 1, 2 or 3 activities of the Main Study, of which 12 and 8 sampled schools participated in type 2 and type 3 activities respectively. The response rates on each instrument for the Overall Study were reported in Table 5.11.

Table 5.11: Response rate of instruments per target group for the Overall Study

Instrument	No. Included in Sample [(a)]	No. of Returns	Response Rate
Quantitative Instruments			
Teachers' Questionnaire	4,130	3,727	90%
IT Team Members' Questionnaire	671	603	90%
Students' Guided Questionnaires	5,011[(b)]	4,912[(g)]	98%
IT Literacy Assessment	1,262[(c)]	1,231[(h)]	98%
Parents' Questionnaires	1,262[(d)]	1,158	92%
IT Activity Daily Log	205[(e)]	189	92%
Qualitative Instruments			
School Heads' Individual Interview	10	10	N/A
Teachers/IT Team Members' Focus Group Interview	10 groups (80 participants)	10 groups (74 participants)	N/A
Students' Focus Group Interview	20 groups (148 participants)	20 groups (147 participants)	N/A
School Visit	20	20	N/A
Classroom Visit	74[(f)]	74	N/A

(a) the actual number per instrument instead of the number derived from the sampling plan
(b) to (f): Some "sampled" schools only have one P3 and/or one P6 class
(g) to (h): Some sampled students were absent on the dates of conduct of fieldwork. No replacements were made by the schools for reasons, such as (1) the fieldwork being conducted before/after school hours; (2) parents of the participating students needed to be informed beforehand

5.5.2 Secondary school sector

The same logistics and procedures of the Primary School Sector apply also to the Secondary School Sector. Responses from the 150 “sampled” secondary schools were also very encouraging, and the “*effective*” sample size was also met. The following table gives a summary of the number of returns of “sampled” schools per stratum/activity type:

Table 5.12: Summary of number of returns of “sampled schools” per stratum/activity type

	Stratum 1	Stratum 2	Stratum 3	Stratum 4	No. of returns of sampled schools
Type 1 only	31	33	32	8	104
Type 2 only	5	3	4	1	13
Type 3	2	3	2	1	8
Total	38	39	38	10	125

Similarly, all of the 413 secondary schools, which included 150 “sampled” schools and 263 “non-sampled” schools, were invited to complete the School Heads’ Questionnaires, and to complete/update the School (IT) Survey Form. The total response rates for these two instruments in the Main Study are reported in the Table 5.13.

Table 5.13: Response rate of School Heads’ Questionnaire and School (IT) Survey Form for secondary school sector in the Main Study

Instruments	No. Included in Sample	No. of Returns	Response Rate
School Heads’ Questionnaire	413	372	90%
School (IT) Survey Forms (update/complete)	413	378	92%

Totally 125 sampled secondary schools participated in either type 1, 2 or 3 activities of the Main Study, of which 13 and 8 sampled schools participated in type 2 and type 3 activities respectively. The response rates on each instrument for the Overall Study were reported in Table 5.14.

Table 5.14: Response rate of instruments per target group for the Overall Study

Instruments	No. Included in Sample [a]	No. of Returns	Response Rate
Quantitative Instruments			
Teachers' Questionnaire	7,122	6,497	91%
IT Team Members' Questionnaire	728	668	91%
Students' Guided Questionnaires	6,426[b]	5,943[g]	92%
IT Literacy Assessment	1,668[b]	1,503[h]	90%
Parents' Questionnaires	1,667[d]	1,265	76%
IT Activity Daily Log	288[e]	267	93%
Qualitative Instruments			
School Heads' Individual Interview	10	10	N/A
Teachers/IT Team Members' Focus Group Interview	10 groups (80 participants)	10 groups (80 participants)	N/A
Students' Focus Group Interview	21 groups (186 participants)	21 groups (167 participants)	N/A
School Visit	21	21	N/A
Classroom Visit	123[f]	123	N/A

(a) the actual number per instrument instead of the number derived from the sampling plan
(b) to (f) Some schools do not have S6, or only have S6;
(g) to (h) Some sampled students were absent on the dates of conduct of fieldwork. No replacements were made by the schools for reasons, such as (1) the fieldwork was conducted before/after school hours; (2) need to inform parents beforehand

5.5.3 Special school sector

Table 5.15 gives the summary of the number of returns of special schools. It can be seen that the "effective" sample size of 25 was also achieved by the Project Team in the Overall Study.

Table 5.15: Summary of number of returns of "sampled schools" per type of schools/activity type

Type of Schools	Activity Type 1 only	Activity Type 2	Total
Mildly and Moderately Mentally Handicapped (Mmod)	2	1	3
Mildly Mentally Handicapped (M)	2	1	3
Moderately Mentally Handicapped (Mod)	2	1	3
Severely Mentally Handicapped (S)	2	1	3
Physically Handicapped (PH)	1	1	2
Hospital (H)	0	1	1
School for Social Development (SD)	2	1	3
Hearing Impaired (HI)	1	1	2
Visually Impaired (VI)	1	0[a]	1
Skill Opportunity School (SOS)	1	1	2
Practical School (PS)	1 [b]	1 [b]	2
No. of returns of sampled schools	**15**	**10**	**25**

(a) The initially invited "VI" school declined to participate in "type 2 activity", and was thus switched to "type 1 activity"
(b) There are 4 schools in "PS". The two "sampled" schools rejected our invitation. After this rejection the EMB invited two different "PS" schools to replace the former two.

All of the 72 special schools, including the 30 "sampled" schools and 42 "non-sampled" schools, were invited to complete the S*chool Heads' Questionnaires*, and to complete/update the *School Information Technology (IT) Survey Form*. The response rates for these two instruments in the Overall Study are reported in Table 5.16.

Table 5.16: Response rate of School Heads' Questionnaire and School (IT) Survey Form for special school sector in the Main Study

Instruments	No. Included in Sample	No. of Returns	Response Rate
Quantitative Instruments			
School Heads' Questionnaire	72	66	92%
School IT Survey Forms (update/complete)	72	66	92%

Totally 25 sampled special schools participated in either type 1 or 2 activities of the Main Study, of which 10 sampled schools participated in type 2 activity. The response rates on each instrument for the Overall Study were reported in Table 5.17.

Table 5.17: Response rate of instruments per target group for the Overall Study

Instruments	No. Included in Sample (a)	No. of Returns	Response Rate
Quantitative Instruments			
Teachers' Questionnaire	663	641	97%
IT Team Members' Questionnaire	114	109	96%
Specialists'/Therapists' Questionnaire	62	60	97%
Students' Guided Questionnaires	381	376	99%
IT Literacy Assessment	381	378	99%
IT Activity Daily Log	148	133	90%
Qualitative Instruments			
School Heads Focus Group Interview	3 groups (16 participants) (b)	1 individual interview and 2 groups (9 participants) (e)	N/A
Teachers, IT Team Members Focus Group Interview	5 groups (27 participants) (c)	3 groups (12 participants) (f)	N/A
Specialists/Therapists Focus Group Interview	3 groups (16 participants) (d)	2 groups (7 participants) (g)	N/A
Students' Focus Group Interview	11 groups (44 Participants)	10 groups (39 participants)	N/A
Student's Individual Interviews	101	74(h)	N/A
Parent's Individual Interviews	70	38(i)	N/A
School Visit	10	10	N/A
Classroom Visit	41	40	N/A

(a) *the actual number per instrument instead of the number derived from the sampling plan*
(b) *1 focus group interview was arranged in Pilot Study for 5 school heads; 2 focus group interviews were arranged in Main Study for 11 school heads.*
(c) *1 focus group interview was arranged for 5 teachers/IT team members in Pilot Study; 2 focus group interviews were arranged for 11 teachers, and 2 focus group interviews were arranged for 11 IT team members in Main Study.*
(d) *1 focus group interview was arranged for 5 specialists/therapists in Pilot Study; 2 focus group interviews were arranged for 11 specialist/therapists in Main Study.*
(e) *1 individual interview and 1 focus group interview (3 participants) were conducted in the Pilot Study; 1 focus group interview (6 participants) was conducted in the Main Study.*
(f) *1 focus group interview for teachers/IT Team members (3 participants) were conducted in the Pilot Study; 1 focus group interview for teachers (4 participants) and 1 focus group interview for IT team members (5 participants) were conducted in Main Study.*
(g) *1 focus group for specialists/therapists (4 participants) was conduct in Pilot Study and 1 focus group interview for specialists/therapists (3 participants) was conducted in Main Study.*
(h) *(1)Had attempted to conduct the interviews, but due to students' poor cognitive level and speech difficulties, some cases were unsuccessful; (2) some interviews could not be conducted because of absentees*
(i) *Some parents rejected to participate*

5.5.4 Other stakeholders

The following focus group/individual interviews were conducted for the Overall Study:

Table 5.18: Summary of Focus Group/Individual Interviews for other stakeholders conducted in the Overall Study

Subject	No of Interviews/ Discussions	No. of Participants	Format	Participated Groups
A) Trade Organisations				
Trade Associations	1	4	Focus group discussion	- Hong Kong Chinese Importers' & Exporters' Association - Employers' Federation of Hong Kong - HK Chamber of Small and Medium Business - The Professional Validation Council of Hong Kong industries
B) Other Organisations				
Education and IT- related associations	1	3	Focus group discussion	- Committee on Home-School Co-operation - Hong Kong Subsidised Secondary Schools Council - Subsidised Primary Schools Council
Teachers' Associations	1	2	Focus group discussion	- Hong Kong Federation of Education Workers - Hong Kong Professional Teachers' Union
School Heads' Association	1	4	Focus group discussion	- The Association of Heads of Primary Schools - The Association of Heads of Secondary Schools - Hong Kong Sheng Kung Hui - Association of Principals of Government
School Sponsoring Bodies	1	4	Focus group discussion	- The Hong Kong Council of the Church of Christ in China - Hong Kong Sheng Kung Hui (監理委員會) - Po Leung Kuk - The Lutheran Church Hong Kong
Tertiary Education Institutions	3	3	Individual interview	- University of Hong Kong - Chinese University of Hong Kong - Hong Kong Institute of Education
NGOs with parent education services	1	2	Focus group discussion	- The Boy's and Girl's Clubs Association of Hong Kong - Hong Kong Caritas

Subject	No of Interviews/ Discussions	Format	Participated Groups
C) Education and Manpower Bureau			
ITEd project officers in charge	8	Individual interview	<u>Access and Connectivity</u> - Mr. T.W. Sin, Senior Inspector (Regional Support) - Mr. M She, Principal Inspector (Regional Support) <u>Community Wide Culture</u> - Mr. Michael Lui, Inspector (Regional Support) <u>Curriculum & Resource Support</u> - Mr. W. C. Cheng, Senior Inspector (IT Education Resource Centre) - Mr. Simon Ip, Principal Inspector (Curriculum Resources) <u>Teacher Enablement</u> - Mr. David Li, Education Officer (School Information Systems) - Mr. C.Y. Chan, Senior Education Officer (School Information Systems) <u>Others</u> - Mr. Ma Siu Leung, ex-Principal Assistant Secretary for Education and Manpower
Policy Makers/ Directorates	2	Individual interview	- Mr. Y.C. Cheng, Deputy Secretary (School Support & Development Branch) - Mr. Chris Wardlaw, Deputy Secretary (Curriculum & Quality Assurance Branch)
D) Commerce, Industry & Technology Bureau			
Policy Maker/ Directorate	1	Individual interview	- Ms Helen Tang, Principal Assistant Secretary (Communications and Technology Division B)

Chapter 6 General Findings from Primary School Sector

This chapter reports the general findings for the Primary School Sector. It draws upon the descriptive data from the range of questionnaire surveys and the observations collected from the qualitative instruments that address the following aspects of the ITEd initiatives for this sector:

- § Access, connectivity and usage
- § Teacher enablement
- § Curriculum, pedagogy and resource support
- § School and wider community culture, and
- § Student learning.

6.1 Access, connectivity and usage

This section examines the extent and nature of access to and usage of IT in the surveyed primary schools and the school heads', teachers' and students' homes. It begins with a breakdown of the numbers and locations in schools of hardware and the extent and nature of connectivity in schools. It also reports the expenditure patterns of school-based IT budgets. This section also looks into access and connectivity at home and finally examines general usage patterns of primary school heads, teachers and students.

6.1.1 Access to school IT facilities

Huge progress in IT infrastructure in schools over the five-year period has been observed and the EMB Document analysis gives a very clear picture of the extensive amount of input and support given by the EMB in terms of financial, advisory and training support.

Quantities and locations of hardware

Table 6.1 gives an overview of the mean numbers of different types of hardware in primary schools, obtained from the School IT Survey Item 2a.

Table 6.1: Quantity of hardware (School IT Survey, Q. 2a)

Item	Mean	SD
Desktop computers	78.6	43.1
Notebook computers	11.2	10.0
Server machines	4.4	2.5
Application servers	4.7	2.5
Application server that does not run on MS Windows/NT platform	0.5	0.5
Wireless LAN	1.2	3.6
Video Capture Encoding System	1.0	1.6
Video Conferencing System	0.4	2.5
Digital camera	2.1	2.3
Voice input/recognition system	0.3	4.3
Video broadcasting system	0.3	0.5
Digital Camcorder	1.3	1.2
Electronic musical instrument	1.3	4.1
Visualisers	4.0	6.5
Color Laser Printers	1.2	1.4
Bar code scanner	1.2	2.9
CD-RW	6.1	7.8
DVD-writers	0.2	0.8
LCD Monitors	6.7	14.4
Smart card reader	0.3	0.9

Note: N = 616

The average of 89.8 computers per school (78.6 desktop computers and 11.2 notebook computers) far exceeds EMB's initial target of 40 per school, and is much higher than the average of 64.3 reported in the Preliminary Study for primary schools. Table 6.2 shows the distribution with respect to the total number of computers and it can be seen that it is quite skewed.

Table 6.2: Distribution of schools with respect to total number of computers

Total number of computers in school	Number of schools	%
≥ 160	44	7.1
120 – <160	98	15.9
80 – <120	168	27.3
40 – <80	257	41.7
< 40	49	8.0
Total	616	100

The highest number of computers in one school is 307. 44 schools (7.1%) reported having 160 or more, 306 (49.7%) have less than 80 and 49 (8%) reported having less than 40. It should be noted that a small number of computers does not necessarily mean limited access, especially if the number of students and classes is small, for example in a village school.

Table 6.3 shows the distribution of student-computer ratios across schools. The average student to computer ratio (excluding computers in the staff rooms or general office) is 10 to 1 (SD=8.4). When taking into account all computers in the school, including those in the staffrooms, offices, etc. the ratio is 7.4 students per computer. This shows a progressive improvement in the ratio from the average of 53 students per computer for Hong Kong reported in the SITES-M1 study and 13.4 reported in the Preliminary Study for primary schools. It can be seen from Table 6.3 that the majority of schools (57%) have student to computer ratios that fall within the range of four to less than twelve students per computer. There are 83 schools (13.5%) with better than four to one ratio and 39 schools (6.3%) with 20 or more students per computer.

Table 6.3: Distribution of schools with respect to student-computer ratios

Student-computer ratio	Number of schools	%
≥ 20	39	6.3
16 – <20	48	7.8
12 – <16	94	15.3
8 – <12	157	25.5
4 – <8	194	31.5
< 4	83	13.5
Total	615	100

As can be seen from Table 6.4, on average 11.8 computers per primary school were allocated to general classrooms. This is higher than the overall average of 6.3 reported in the Preliminary Study. Those primary schools that reported having computer rooms, MMLCs or ITLCs indicated an average of approximately 33 each per computer room and MMLC and 36 per ITLC. Schools indicated an average of 7.9 LCD projectors per school located in general classrooms. This figure is much higher than the average of 4.9 video projectors per school reported in the Preliminary Study.

Table 6.4: Locations of computing/network facilities installed (School IT Survey, Q. 2b)

Locations	N	Computers		LCD Projectors		Network ports		Wireless, hub or switch connection	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
General classrooms	616	11.8 (6.3)	12.0	7.9	9.9	23.4	63.4	0	NA
Computer rooms	595	33.1 (28.3)	13.7	1.1	1.5	34.3	16.7	0.002	0.04
MMLC	131	32.8	13.8	1.1	1.9	33.9	15.6	0	NA
ITLC	131	36.1	11.5	1.2	3.5	35.6	14.6	0	NA
Library	483	5.3 (4.2)	4.3	0.3	0.5	5.9	5.4	0.01	0.2
Special rooms for educational purposes	429	3.8 (1.0)	6.8	1.2	1.3	4.7	7.2	0	NA
Staff rooms	592	6.4 (5.3)	6.5	0.1	0.5	9.1	11.6	0.003	0.08
General office	600	4.5	2.8	0.1	0.7	4.9	7.9	0.002	0.04

Note: The mean in these tables represent the average numbers calculated for the schools that reported to have the facilities housed in the particular location.
Figures in brackets represent Preliminary Study figures.
N = Number of schools reporting to have computing/network facilities installed in that location

The data collected from the School Tours can give further information about the locations of computers in the sub-sample of schools visited. Many schools that were visited have at least some classrooms without permanent computers. Consequently many teachers wanting to use IT in their teaching have to take the students to the computer rooms for the lesson. Alternatively, some teachers used notebook computers and in other cases the equipment was wheeled from room to room on a trolley. Furthermore, it was observed that some schools had only 20 computers in a computer room and none in classrooms. In the teacher focus group interviews the teachers were quite divided with respect to their satisfaction with resources. While some were happy with the resources available to them, others complained that there were insufficient resources. One reason for complaint was that in the computer rooms there were often twenty computers to serve a class of forty students, thus meaning that there were not sufficient computers for each child to have individual use of one. Their complaints might also be connected to the low average number of computers available in staff rooms, which could mean that teachers do not have adequate access to computers for their own use when they need it. The School Tours and focus group interviews with teachers indicated quite a wide variation in the provision of computers for teachers' exclusive use in school. In some primary schools there are only three or four computers, located in a small room, for the whole staff to share, whereas in others there is easy access. In a small number of the schools observed, teachers are able to borrow laptops to take home.

In the School Visits it was found that 18 out of the 20 schools visited have some provision in place for students to access computers in the computer room, library and/or covered playground out of school hours, mostly at recess time and before or after school. Thirteen of the schools have arrangements for students to stay after school to access IT facilities. Schools have different arrangements, the most common of which is to require students to seek prior permission from their parents before they are allowed to do so. Some schools let their students stay after school to use computers freely but require them to sign in before they enter the computer room. While some schools do not place any restrictions on when students can access computers out of school hours, some others set a timetable for different class groups.

Table 6.5 shows the percentages of schools with school websites and email accounts for teachers, students and parents, as reported in the School IT Survey item 4a. Clearly, nearly all of the primary schools (97.2%) in the sample have a school website. It can be seen that only 41.1% of the surveyed primary schools provide email accounts for their staff and 24.8% provide email accounts for their students, although 84.3% make use of free email accounts provided by other services for their staff and 44.2% make use of these for their students. Very little provision of email accounts is made for parents. 69.6% of schools have an intranet for staff but only about half have subject or teaching websites or intranet for students. Only 40.6% have teachers' homepages, and students' homepages are even less common (25%). Presumably the setting up of the staff Intranet was seen as a first step, to enable communication within the school, before the setting up of other websites or homepages.

Table 6.5: Percentage of schools with school website and email accounts for teachers, students and parents (School IT Survey, Q. 4a)

Services	Number of schools with the services	%
School website	599	97.2
Subject/teaching websites or homepages	321	52.1
Intranet for staff	429	69.6
Teachers' homepages (one or more)	250	40.6
Intranet for students	320	51.9
Students' homepages (one or more)	154	25.0
Email accounts on school email server dedicated to:		
Teaching staff	253	41.1
Students	153	24.8
Parents	26	4.2
Free email accounts from other sources allocated by school to:		
Teaching staff	519	84.3
Students	272	44.2
Parents	71	11.5

N = 616

Connectivity

All primary schools surveyed reported having connection to the Internet. Of these, 95.8% reported that they have broadband Internet connection, and 47% have a connection speed at 10 Mbps or above (School IT Survey item 2c). Some students reported in the student interviews that the Internet access is still slow. From School IT Survey item 2b(i) it can be seen that while most of the schools have network ports in general classrooms and 57% of the respondents to this item have them in 19 or more rooms, 8.9% indicated that they do not have them in any general classrooms.

As mentioned above, the School IT Survey data show that 97.2% of the primary schools surveyed have a school website and 95% of the P6 students from those schools with websites said they knew about this (Students' Questionnaire item 14a), suggesting that there is a high level of awareness among the senior primary students about this kind of facility. P3 students, on the other hand, showed that they are less aware, with only 76.5% saying yes and 18.5% being unsure.

Budgeted Expenditure

As can be seen from Table 6.6 (School Heads' Questionnaire item 13), the total budgeted expenditure on IT reported by the responding primary schools for the academic year 2003/04 was approximately HK$94 million and the highest proportion of expenditure was on hardware, consumables and technical support. Professional development and training for primary school staff has generally received a very small sum from the school budget in comparison to the amount spent on hardware. Nevertheless, the low proportion of budgets allocated to professional development/training for staff should not be misconstrued to suggest that this has not been given attention. In fact, there are two explanations for this. The first is that a separate non-recurrent 'IT Training Grant' was provided by EMB for staff training from 1998/99 to 2002/03. The second is that EMB provided teachers' refresher courses, sharing sessions and seminars and in addition to this staff development often took the form of internal sharing sessions within schools, hence the cost was low. However, it may give rise to concern in the long term, when schools are given more autonomy in allocating their budgets. While the school heads' interviews revealed that they normally follow the earmarked purposes for budget allocation, most of them suggested that they regard the hardware to be the most important aspect of the ITEd initiatives and put more emphasis on this than on other areas.

Table 6.6: Budgeted expenditure on IT in Education in school for academic year 03/04 (School Heads' Questionnaire, Q. 13)

Items	**Total reported amount (HK $)**	**% of total expenditure by school on IT**	**Number of schools reporting non-zero expenses**
Hardware	43 447 506	46.2	510
Consumable items and other general expenses	21 381 389	22.7	541
Technical support services (excluding resources/ grants/allowances provided by government)	10 865 777	11.6	405
Software	8 855 182	9.4	527
Professional training/development for staff	2 580 442	2.7	439
Others	6 884 377	7.3	151
Total	94 014 673	100	-

6.1.2 Access and connectivity at home

Home ownership of computers seems to be very common for primary school heads and teachers, as indicated by School Heads' and Teachers' Questionnaire items 1a. 97.7% of the school heads and 98.3% of the teachers said that they had at least one computer at home. The student data (Students' Questionnaire item 1) indicate that 84.4% of the P3 students and 93% of the P6 students have at least one computer at home. The pattern is similar for the parent sub-sample (Parents' Questionnaire item 4), with 82.5% of parents of P3 students and 94% of parents of P6 students reporting they have at least one computer. This suggests an increase in home ownership by primary school children since the Preliminary Study (80%) and certainly quite a large increase compared to SITES-M1 Study which reported only about half of P6 students owning home computers. These figures are consistent with the data presented by the *Thematic Household Survey on Information Technology Usage and Penetration* (Census and Statistics Department of Hong Kong, 2003 and 2004). Regarding connectivity at home, when we look at the data for those who reported having computers at home, 96.3% of school heads (School Heads' Questionnaire item 1b), 94.8% of teachers (Teachers' Questionnaire item 1b), 90.2% of P6 students and 79% of P3 students (Students' Questionnaire item 1a) reported that they have Internet connections at home. This result suggests that Internet connection for students has increased considerably since the Preliminary Study (69% of the P6 students with home computers) and SITES-M1 studies (37% of the P6 students with home computers), although the patterns for teachers seem to be consistent with the Preliminary Study findings. This broad picture indicates that home computers are quite widely available for both primary teachers and students. However, it must be emphasised that having a computer at home does not necessarily mean having access. For example, many of the P3 students interviewed mentioned that their home computers are usually dominated by their older siblings. They also mentioned that their parents sometimes lock up the computer for fear of their children playing with it without the parents' control.

6.1.3 Usage

According to the School IT Survey (item 4c), school administration and teaching and learning were ranked as the most common uses of IT in primary schools, with means of 4.8 and 4.1 respectively on a 6-point scale (where 1 represents 'practically no use' and 6 represents 'using the software most of the time') measuring extent of use. School library use had a mean of 3.8 but communication with staff, students and parents all had means of less than 3.

School heads

Nearly all of the primary school heads interviewed had computers in their offices for their exclusive use. During the month prior to completing the questionnaire, the majority of school heads (97.9%) had made at least some daily use of computers (School Heads' Questionnaire item 1e). 53.4% spent up to two hours per day and a further 24.4% spent two to less than four hours. Only 7.4% said they had spent more than 10 hours. The most common use by primary school heads (School Heads' Questionnaire item 2) was for school administration (94.9% using computers occasionally or always for this purpose), followed by researching or analysing school data (71.8%). 60.4% said they occasionally or always used it for inter-school communications and joint school activities, but less than half indicated that they had occasionally or always used it for communicating with students, teachers or parents or for teaching.

The usage patterns at home are similar, but the numbers using computers at home are slightly lower. 71.6% had used computers at home for up to two hours per day, 13.4% for two to less than four hours, and 7% for more than 10 hours. Only 3.3% said they had not used computers at home at all during this period (School Heads' Questionnaire item 1c). More than 74% used their home computers for job-related tasks (77%) or for communication (74.6%) or browsing/searching for information (75.5%) (School Heads' Questionnaire item 1d). Very few used it for other purposes like reading news, entertainment or personal matters like banking.

Teachers

The School Visits and Focus Group Interviews with teachers indicated wide variation in their access to computers for their own use in school. In some primary schools, due to insufficient space in staff rooms, there are only three or four computers located in a small room for all the teachers to share, whereas in others there is easy and abundant access. The School Survey (item 2b) revealed that 19.3% of the primary schools surveyed had two or less computers in staffrooms, 41.1% had 4 or less and 64.8% had 6 or less. 10% of schools reported having 11 or more computers in staffrooms. Some schools have implemented different policies to encourage teachers' usage, like two teachers sharing one notebook (half a year for each) or the school subsidises a fixed amount of money for teachers to buy their own.

In the Teachers' Questionnaire item 1e, 96.3% of teachers reported having made some use of computers at school. 66.2% reported that, in school, they had used computers for up to two hours per day and 14.4% had used them for two to less than four hours. 7.8% had used them for more than 10 hours. 81% said they used computers in school for teaching and around 60% for school administration or management and browsing or searching for information (Teachers' Questionnaire item 1f). Only a small proportion of teachers in primary schools reported using school computers for communication or research on teaching.

At home, only 2.8% of the teachers reported that they had not used computers at all. 53.9% of the teachers had used computers for up to two hours and 20.9% for two to less than four hours (Teachers' Questionnaire item 1c). Their main purpose for using computers at home (Teachers' Questionnaire item 1d) was for job-related tasks (86.2%), followed by communication (71.5%) and browsing or searching for information (73.1%). Similar to the findings for the school heads, reading news, entertainment and personal matters were not very commonly reported uses by primary school teachers.

Students

78.7% of P3 students and 85.1% of P6 students reported having made at least some use of computers at school (Students' Questionnaire item 2). 93% and 95.9% respectively had made at least some use of computers at home over the same period, showing clearly that more primary school children use computers at home than at school. 77.8% of P3 and 77.2% of P6 students reported having no use or less than one hour's use of computers at school per day. On the other hand at home (Students' Questionnaire item 1b), 54.1% of P3 and 28.1% of P6 students reported no use or less than one hour's use per day. 45.9% of P3 students and 71.9% of P6 students had spent one hour or more and the percentage of P6 students spending 3 hours or more per day (32.2%) is more than double the percentage of P3 students (14.6%). 76.3% of P3 students and 85.7% of P6 students said they had used computers at home for school or learning-related activities, 64.2% and 72.5% respectively doing this kind of activity for less than two hours per day (Students' Questionnaire item 1c).

From Student Questionnaire item 4 (Table 6.7), it can be seen that the most common use of computers at school for both P3 and P6 is searching for information in the Internet – even more than learning computer skills themselves. More P3 students reported using computers at school for drilling exercises and creative work, although the percentages reporting these are quite low. Higher percentages of P6 than P3 students reported all of the other listed uses.

Table 6.7: Nature of students' use of computers in school (Students' Questionnaire, Q. 4)

Nature of Use	P3 (N = 2436)	P6 (N = 2476)
	%	%
Searching for information on the Internet	33.5	58.5
Project work	9.1	32.0
Drilling exercises	18.9	10.0
Creative work	12.8	11.1
Presentations/PowerPoint	1.9	13.3
Learning computer skills	30.7	38.1
Self-learning software	6.7	11.1

Note: Multiple response items

Students from both P3 and P6 indicated that the most common location for using computers outside of school hours is their own home (70.6% and 82.8% respectively), with 26.3% of P3 and 26.9% of P6 saying they use public libraries and 19.4% of P3 and 23.2% of P6 students their own school facilities (Students' Questionnaire item 16). In the student focus group interviews, some students said they make use of school access time to do their homework, but this was mostly P3 students. Many of the P6 students said that they mostly prefer to use these breaks from classes to talk with their friends and relax. Another popular location of out-of-school computer use by primary school students is other people's homes (22.7% and 37.3% for P3 and P6 respectively). Very few primary school students indicated that they make use of community/youth centres (7% of P3 and 8.4% of P6 students), or cyber-cafes (3.4% of P3 and 9.9% of P6 students). This low use is further corroborated by the focus group interviews, in which very few students mentioned that they have used community/youth centres for IT access. It is interesting to note that there is quite a sharp increase from P3 to P6 in the percentages of students using computers in their own or other peoples' homes – again supporting the suggestion discussed elsewhere that for older children computer use becomes a part of their social leisure activity patterns (Tell, 1999/2000).

Students were also asked to elaborate further on the average time per day spent, outside school hours, on a range of activities (Student Questionnaire item 17). The results are shown in Table 6.8.

Table 6.8: Average amount of time spent by students per day outside school hours on various activities (Students' Questionnaire, Q. 17)

Activities	**P3**								**P6**							
	N	**% of students choosing**							**N**	**% of students choosing**						
		None at all	**< 30 min**	**30 min to < 1hr**	**1 to < 2 hrs**	**2 to < 3 hrs**	**3 to < 4 hrs**	**≥ 4 hrs**		**None at all**	**< 30 min**	**30 min to < 1hr**	**1 to < 2 hrs**	**2 to < 3 hrs**	**3 to < 4 hrs**	**≥ 4 hrs**
a	2427	40.5	29.6	19.8	7.2	1.3	0.4	1.2	2470	25.0	31.8	28.2	10.6	2.4	0.8	1.3
b	2398	48.9	27.7	15.1	5.4	1.2	0.7	1.1	2461	34.9	37.3	19.8	5.8	1.1	0.3	0.8
c	2386	37.6	31.9	18.7	8.4	1.6	0.6	1.2	2450	32.0	38.0	21.6	6.1	1.6	0.4	0.4
d	2395	29.8	29.7	22.3	11.0	3.7	0.8	2.8	2453	10.4	21.7	34.1	22.8	6.1	2.5	2.4
e	2386	18.8	25.9	24.7	15.1	6.0	2.7	6.9	2452	8.6	14.7	19.8	22.8	14.0	6.6	13.7
f	2405	49.2	28.4	13.3	5.4	1.5	0.8	1.5	2456	38.4	33.1	17.1	7.6	2.2	0.9	0.8
g	2397	52.0	24.2	12.0	6.7	2.0	0.9	2.3	2462	29.3	24.0	19.5	13.4	5.6	2.7	5.5
h	2402	77.7	10.6	5.2	3.6	0.8	0.9	1.2	2460	65.8	16.7	8.2	4.4	1.9	1.2	1.8
i	2407	69.8	14.2	7.6	3.5	1.6	1.3	2.1	2464	35.9	18.5	16.6	11.4	6.5	3.8	7.4

a. Assignments
b. Using instructional software
c. Participating in other school/learning related activities
d. Searching for information on the Internet
e. Entertainment
f. Downloading documents/files for learning
g. Downloading music/movies/freeware
h. Communicating with teachers through E-mail/ICQ
i. Communicating with classmates/friends through E-mail/ICQ

Between 50.8% and 62.4% of P3 students and between 61.6% and 75% of P6 students indicated they had done at least some learning-related activities such as completing assignments, using instructional software, downloading documents or files for learning, or participating in other school-related learning activities. There is a consistent pattern of higher percentages of P6 students having engaged in these activities. On the other hand, it is clear that entertainment-related activities are more popular with both P3 and P6 students, with 81.2% and 91.4% respectively having spent at least some time on these. Again related to entertainment there are quite large differences between the proportions of P3 and P6 students having participated in downloading music or movies (48% and 70.7%) and particularly in the use of ICQ or email to communicate with classmates or friends (30.2% and 64.1%).

It was also found in the Student Focus Group Interviews that entertainment is a dominant use of computers by primary school children. Usually the first answer the students gave when asked how they use computers outside school was that they use them for games. It was only when asked how they use their home computers for study purposes that they elaborated with details about Internet browsing, usually for projects. Some said they search the Internet for interesting games or to read the news, but their use is not solely for entertainment. In cases where teachers gave them some kind of specific learning targets such as I-CUBE (www.icubeworld.com) or A passage a day (www.prof-ho.com/reading), then the students seem to have reported higher use of IT for learning purposes.

In nearly all of the examples of learning-related activities listed in Students' Questionnaire item 17, around half of the P3 students and slightly more than half of the P6 students indicated that they spent less than one hour per day. Considerably more P6 students indicated that they had made some use of searching for information on the Internet (89.6% compared to 70.2% of P3), again with slightly more than half indicating that they had spent less than one hour per day on this activity. It is not clear from this question whether their Internet use was for school-related or entertainment purposes, although the student focus group interviews suggested the former and that children actually like using it for this purpose because it makes searching for information easier. When it came to the entertainment-related activities, however, 30.7% of P3 students and 57.1% of P6 students said that they spent more than one hour on average per day. In fact it is somewhat bewildering to see that 9.6% of P3 students and 20.3% of P6 reported having spent more than three hours on average per day on entertainment activities using IT.

Further evidence of the increased importance placed by P6 students on communication when compared to P3 students can be seen by the data about numbers of email accounts and personal websites (Students' Questionnaire items 18 and 19). 44.8% of P3 students have at least one email account compared to 82.4% of P6. 16.7% of P3 students and 48.8% of P6 students have multiple accounts. On the other hand, personal websites do not seem to be a high priority for primary school students. The majority of either grade level does not have any personal websites (66.6% and 70.9% respectively) and of those who do, 16.8% of P3 and 20.9% of P6 students have only one.

It can be noted that the usage patterns indicated by these data are similar to those shown by the students who completed the IT Activity Daily Log, reported in Section 6.5.3. Parent data can also be used to triangulate the students' home use of computers. Their responses to Parents' Questionnaire item 4b corroborate the students' claims that the most common activity is entertainment, followed by searching for information on the Internet and doing activities related to school learning, again with more P6 than P3 students doing all of these things. It is encouraging to see that the parents seem to be aware of what their children are doing with their home computers.

6.2 Teacher enablement

This section describes primary school heads, teachers' and IT team members' perceptions of issues relating to teacher enablement. First, it looks at primary teachers' competence by investigating the extent to which the targets of the *Five-Year Strategy* for IT training for teachers have been met. Related to this is an examination of the most-used providers of professional development activities and the relative effectiveness of these. Since teacher enablement is linked closely with motivation, the factors that motivate teachers both to learn IT skills and to use them in their teaching have been considered, along with the impact of IT on their teaching. Finally, this section looks at the obstacles and difficulties to implementing IT effectively in education and the teachers' future development needs.

6.2.1 IT competence level of teachers

It is encouraging to see from Table 6.9 (Teachers' Questionnaire item 21) that 94.4% of the primary school teachers surveyed reported that they had reached at least BIT level or equivalent in terms of their IT competence. 84.3% reported having reached the level of IIT, and 43.4% and 6.6% at UIT and AIT levels respectively. When the valid percentage is considered (after excluding those teachers who did not respond to this question), the percentages of teachers reported having reached the levels of BIT, IIT, UIT and AIT were 100%, 89.2%, 45.9% and 7% respectively. In the Preliminary Study 89.6% of the primary school teachers said that they had submitted portfolios for BIT, 40.9% for IIT and 2.3% for UIT. This, therefore, suggests quite a large increase in the percentages of teachers with these qualifications.

Table 6.9: Highest level of IT competence attained by teachers (Teachers' Questionnaire, Q. 21)

Highest Level attained	**%** **(N = 3727)**	**Valid %** **(N = 3517)**	**Cum. valid** **%**
AIT	6.6	7.0	7.0
UIT	36.8	38.9	45.9
IIT	40.9	43.3	89.2
BIT	10.1	10.8	100.0
Non response	5.6	--	--
Total	100.0	100.0	--

However, when teachers were asked to rate themselves with respect to their stage of adopting/using IT (Table 6.10, Teachers' Questionnaire item 1g) only 71.8% rated themselves as comfortable/confident, competent or creative – interestingly a very similar pattern as for the school heads' self-ratings (School Heads' Questionnaire item 4), with 77.7% in the same categories. While it is good to see that around three-quarters of the teachers have come to regard themselves as at least comfortable/confident users after the efforts put into IT training over the five-year period, these figures do raise some concern particularly because approximately one-quarter of each of school heads and teachers still regard themselves as beginners, novices or non-users.

Table 6.10: School Heads' and Teachers' self ratings on stage of adopting or using IT (School Heads' Questionnaire, Q. 4; Teachers' Questionnaire, Q. 1g)

Stage	Description	School Heads (N = 605)		Teachers (N = 3627)	
		%	Cum. %	%	Cum. %
6	Creative (can use it effectively for teaching/administration and integrate into work in creative way)	11.1	11.1	9.3	9.3
5	Competent (able to apply appropriately to conduct/assist teaching)	40.0	51.1	38.2	47.5
4	Comfortable/confident (comfortable and confident in using it for certain tasks)	26.6	77.7	24.3	71.8
3	Beginner (beginning to understand procedures and able to use for certain tasks)	16.5	94.2	20.7	92.5
2	Novice (learning the basic skills but basically not confident and often encounter difficulties)	4.5	98.7	5.0	97.5
1	Non-user (aware of availability but rarely/never use it)	1.3	100.0	2.5	100.0
	Total	100.0	-	100.0	-

When we look at the competence level of the teachers in terms of software skills (Teachers' Questionnaire item 13), we find that the majority of primary school teachers have reported themselves to have achieved basic proficiency or above in the following areas: word processing (91.1%), communication (71.1%), Internet (80.3%) and presentation software (71.1%). These were also amongst the skills given the highest ratings in the Preliminary Study. On the other hand, the competence levels reported in using more advanced tools that support interactive instructional design, such as simulations, databases, graphic and design tools, are all relatively low, with less than 50% reporting competence to use these in their teaching. It is also interesting to note that only 60% of teachers reported that they were proficient in applying/integrating IT into their subject curricula.

In the teacher focus-group interviews, a number of teachers mentioned that after receiving their training they felt they had reached a comfortable level of competence in using hardware and software. However, several of them expressed the view that the training programmes in which they had participated were too technically-based and that they do not need such a high level of technical knowledge but rather need to know how to apply IT in their classroom teaching. The following quotations from the teachers' interviews indicate the feeling that if they are to use IT effectively they need more than the tools. They need the direction and the understanding of how it fits in with the overall educational policy.

> *To achieve effectiveness, teachers need to know how to apply IT tools in the flow of their teaching.*

> *IT is only a tool, a tool bringing students to the knowledge world...You only give me the tool but not the direction.*

These qualitative data support the suggestion that one of the main problems with regard to teacher competence is that the training they have received has focused more on computer skills than on good pedagogical use. However, an examination of the EMB documents indicates that, in addition to the very extensive training in skills and management issues, the EMB offered quite a large number of pedagogically-related teacher professional development activities and web-based self-learning packages as well as workshops on the use of IT to support assessment and opportunities for teachers to share good practices. Many of these were offered from the early days of the initiative and covered a wide range of curriculum areas. When examining participants' evaluations of these courses (EMB

Document analysis) it is clear that they were quite satisfied with the pedagogically-oriented courses. For example, the evaluations of the professional development courses conducted by the Institute of Education for subject teachers in primary schools (EMB Documents) indicate that the participants were generally satisfied with respect to usefulness, content and application to teaching and learning, although there might be some important clues in their relative dissatisfaction with pace, duration and practicum. Nevertheless, it has been noted from the EMB Document analysis that the numbers of teachers participating in pedagogically-related courses can be counted in hundreds, compared to the thousands participating in skills training courses.

Two issues were raised in the teachers' focus group interviews. One was that they do not have time to make good use of IT in their teaching but the other, more fundamental, issue that emerged is that they do not have a very clear understanding of what is good use and how to achieve it. This latter is illustrated by the following typical comment from a teacher during a focus group interview:

> *The training courses organized in the past were too focused on technical competence. I do not know how I can make use of the software and the techniques in teaching after the training, even though I have learnt thoroughly all the functions of the software.*

The majority of teachers in the focus group interviews expressed very strongly that if they are to really come to terms with understanding the nature of good pedagogical use of IT in their particular teaching contexts, the most useful form of professional development for them would be experience sharing sessions with other teachers. Frequently they commented that when they did have opportunities for experience sharing it was beneficial to all concerned:

> *Some of our colleagues are really great. When they prepare some good materials or identify some good software, they will share that with other teachers. If it is really useful, other teachers can also use it. We will discuss at the same time how this can be used in other classes and other forms. We can get a lot from sharing and cooperation with each other.*

6.2.2 Participation in IT-related development activities and usefulness of this participation

It is encouraging to note that 95.9% of schools reported that they had an IT Plan/Policy on teacher training/development (School IT Survey item 1h). Development activities provided by schools and the EMB were the most common, with more than 90% of primary school heads and teachers having participated in school-based development activities since the inception of the *Five-Year Strategy* (Table 6.11, School Heads' Questionnaire item 3 and Teachers' Questionnaire item 4), which was higher than the proportions indicated in the Preliminary Study. Since September 2001, 33.9% of staff have received their training from their own schools and 30.4% from EMB (School IT Survey item 3c). There was very little difference reported in the mean effectiveness of the various providers, with all means between 2.5-2.9 on a scale from 0 to 4 where 0 represented 'not very effective' and 4 represented 'very effective'. This suggests that the primary school heads and teachers perceived the provisions to be reasonably effective. Participation in HKedCity for this purpose was reported as low (21.9% of the school heads and 27.6% of the teachers) although this could depend upon the actual number of activities organised by HKedCity that these data do not report.

Table 6.11: School heads' and Teachers' participation in professional training/development activities and rating on effectiveness (School Heads' Questionnaire, Q. 3; Teachers' Questionnaire, Q. 4)

Institute	**School Heads**					**Teachers**				
	%	**N**	**Rating on effectiveness (0 – 4)**			**%**	**N**	**Rating on effectiveness (0 – 4)**		
			Mean	**SD**	**N**			**Mean**	**SE**	**N**
a	92.0	601	2.9	0.6	551	90.6	3634	2.6	0.02	3233
b	92.1	596	2.7	0.7	545	72.2	3564	2.5	0.02	2506
c	21.9	520	2.8	0.6	112	27.6	3467	2.6	0.03	943
d	50.6	538	2.8	0.7	268	52.5	3499	2.7	0.02	1817
e	36.5	524	2.7	0.6	187	27.0	3463	2.6	0.03	899
f	59.1	531	2.6	0.7	306	50.9	3413	2.5	0.02	1663

a. *Your school*
b. *EMB (Formerly ED)*
c. *HKedCity*
d. *Tertiary institutions*
e. *Non-profit making organizations*
f. *Commercial organizations*

Some further information about teachers' use of resources provided for them by the EMB and HKedCity was obtained from the teacher focus group interviews. Some said that they like HKedCity and that the materials are useful, although some that they find it time consuming to find the information that they really want. There was no mention made in any of the focus group interviews of teachers having made use of the Centres of Excellence or regional resource centres, despite the fact that, as mentioned earlier, they are asking for good modelling and sharing of examples of pedagogical use of IT in their teaching areas. It appears, therefore, that there is potential to make these existing resources more accessible to teachers and even to make teachers more aware of their existence as a partial solution to satisfying this need.

The teachers were also asked to indicate their roles in ITEd in terms of the extent of their participation in activities for promoting IT in teaching (Teachers' Questionnaire item 18). 45.8% said they have occasionally or always participated in planning or promoting the use of IT in teaching or the integration of IT into the curriculum – which shows some promise that almost half of the teachers are beginning to take some leadership role. However, only about one-third said they have occasionally or always made suggestions about the purchase of software. It does not seem to be conducive to encouraging teachers to use the software effectively in their classes if they have not been instrumental in making the choice of what to use. Only 22.6% had occasionally or always participated in research on school-based initiatives, despite indications that school-based action research is one of the most effective ways of bringing about change in teachers' paradigms (Kwan and Lee, 1994; NCREL, 2003). Other roles were reported as occurring infrequently: 71.7% said they rarely/never organised/arranged staff to participate in IT training, 76.5% rarely/never provided/arranged technical support in school, 79.8% rarely/never handled tasks related to the maintenance of IT facilities/resources, and 82.2% rarely/never organised exchange programmes to share experiences with other schools relating to IT in education. When we look at teachers' reported roles in helping colleagues to solve problems encountered in using IT in their teaching (Teachers' Questionnaire item 17) we can see evidence of quite active participation, with 67.7% saying they had done this occasionally or always and only 7% saying they had never done this.

6.2.3 Motivation for acquiring IT skills

The main motivations that the primary teachers identified for learning IT skills (Table 6.12, Teachers' Questionnaire item 15) were to improve their teaching (indicated by 79.7%) followed by the desire to acquire a basic life skill (69.9%) and to apply it in teaching (67.6%). Only a few indicated they had been motivated by extrinsic factors such as promotion prospects or the influence of others. It is interesting to note the factors motivating them to learn to use IT are intrinsic, such as improving themselves or improving their work, whereas those motivating them to apply it in their teaching (Table 6.13, Teachers' Questionnaire item 16) are concerned with extrinsic factors such as societal trends or expectation from peers, parents or students. It is also interesting to note that 55.6% and 56.9% were motivated to learn and apply IT respectively because of their school head's request or expectation, thus suggesting that the school leader's expectation contributes to teachers' motivation to participate although it is not the most important one.

There is some inconsistency (Tables 6.12 and 6.13) between the high percentage (79.7%) of teachers who reported they were motivated to learn IT skills to improve their teaching, and the relatively low percentage (41.3%) saying that student accomplishment (including enhancing quality of learning) was a motivator for them when it came to actually applying IT in their teaching (Teachers' Questionnaire item 16). This suggests that these teachers have a conception of teaching with IT rather than facilitating students to achieve quality learning outcomes through IT. From the teacher focus-group and post-class observation interviews during the School Visits it became clear that the teachers at primary school level generally agree IT has the potential to achieve these aims, but whether they actually use IT or not depends on factors such as the subject, the curriculum and the amount of time they have. In the post-lesson interviews, many of the teachers admitted that their primary motivation for acquiring IT skills and using IT in the classroom was to satisfy EMB's requirements. However, some mentioned that they felt it could make teaching materials more interesting for their students.

In fact, the main motivator for applying IT in teaching was reported to be their growing maturity in IT literacy (66.4%), thus suggesting that as their competence and confidence mature they are more willing to attempt to apply IT into their teaching practice.

Table 6.12: Factors motivating teachers to learn IT skills (Teachers' Questionnaire, Q. 15)

Factors	%
Quest for knowledge	66.7
Improve teaching	79.7
Compliments from others	18.9
Apply in teaching	67.6
School/head's request/expectation	55.6
Promotion prospect	11.0
Basic life-skill	69.9
EMB's demand	39.0

Note: N = 3727. Multiple responses items

Table 6.13: Factors motivating teachers to apply IT in teaching (Teachers' Questionnaire, Q. 16)

Factors	%
Maturing in IT literacy	66.4
Students' request/expectation	35.8
School/head's request/expectation	56.9
Students accomplishment (including enhancing quality of learning)	41.3
Colleagues' encouragement	17.4
ITEd policy from government	42.8
Parent's request/expectation	12.7
Trend in education	61.7

Note: N = 3727. Multiple responses items

6.2.4 Impact of ITEd on teachers

On School Heads' Questionnaire item 9b, the primary school heads regarded increased IT knowledge (99.2% rating agree or strongly agree), encouragement for teachers to apply IT in their teaching (95.6%), making school administration/management work more convenient for teachers (92.3%) and enhancing co-operation among teachers (87.7%) as the greatest impacts of IT on teachers' teaching, all with mean ratings higher than 3 on a scale of 0-4 (Table 6.14). The primary school teachers (Table 6.15, Teachers' Questionnaire item 19) rated the highest impact as enhanced teaching effectiveness and, to a lesser extent, increased awareness of the outside world. 70% of the school heads thought that the use of IT had encouraged teachers to make more use of student-centred learning and 69.7% thought that it strengthened communication between teachers and students, but the teachers themselves seemed to be much less sure about this, with less than half suggesting it improved communication and collaboration, even with their own colleagues or with their students. The school heads gave low priority to negative impacts such as teachers' stress levels, lowered self-esteem and confidence, with means below 2 and less than 28% agreeing or strongly agreeing that ITEd had such impacts on the teachers. The teachers themselves placed less importance on negative consequences like less time for class preparation or contact with students and exhaustion caused by information overload than they did on other things, although there were between 35.9% and 45.4% who were bothered by these negative impacts, which is still fairly high. Certainly more teachers indicated awareness of these negative impacts than school heads, which suggests there may be a mismatch in the two groups' perceptions of the stress and time constraints that are really imposed on teachers by the introduction of ITEd. There are only very small differences in the mean ratings on the corresponding item regarding the teachers' perceptions of impact of ITEd on themselves in the Preliminary Study.

Table 6.14: School heads' perception of impact of ITEd on teachers, based on their experience of promoting IT in Education (School Heads' Questionnaire, Q. 9b)

Impact	**Mean (0 – 4)**	**SD**	**N**	**% of school heads choosing the option**				
				Strongly agree	**Agree**	**Neutral/ uncertain**	**Disagree**	**Strongly disagree**
Enhanced co-operation among teachers	3.0	0.5	618	13.6	74.1	11.7	0.7	0.0
Increased IT knowledge	3.4	0.5	620	41.9	57.3	0.7	0.2	0.0
Encouraged teachers to adopt student-centered mode of learning	2.8	0.7	621	13.5	56.5	28.0	1.5	0.5
Strengthened communication among teachers and students	2.8	0.7	619	11.2	58.5	27.5	2.6	0.3
Increased interactions with people outside the school, broadening their professional vision	2.9	0.7	621	15.9	62.6	19.8	1.3	0.3
Teachers are not confident in using IT appropriately	1.4	0.9	617	1.0	13.8	23.2	53.0	9.1
Teachers find using IT stressful	1.8	0.9	621	2.1	25.3	28.5	40.3	3.9
Lowered self-esteem and professional confidence	1.1	0.7	619	0.5	4.2	15.0	62.0	18.3
Strengthened communication among teachers	2.8	0.6	620	8.2	63.6	26.1	1.9	0.2
Encouraged teachers to apply IT in regular teaching	3.1	0.5	621	18.0	77.6	4.2	0.2	0.0
Strengthened communication between teachers and parents	2.5	0.7	620	5.5	43.9	42.6	7.3	0.8
Made school admin/management work more convenient for teachers	3.2	0.6	620	25.2	67.1	6.8	0.8	0.2

Table 6.15: Teachers' perceptions of impact of ITEd on themselves since the introduction of ITEd (Teachers' Questionnaire, Q. 19)

Impact	Mean (0 – 4)	SE	N	% of teachers choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
Enhanced teaching effectiveness	2.8	0.01	3678	10.0	67.1	20.2	2.5	0.2
Exhausted/information overload	2.2	0.02	3661	4.8	31.9	43.9	18.1	1.3
Less time for class preparation	2.3	0.02	3666	8.2	37.2	35.8	17.7	1.2
Less time for contact with students	2.2	0.02	3661	6.2	29.7	40.5	22.1	1.6
Increased awareness about outside world	2.5	0.02	3667	6.9	51.9	31.0	9.1	1.1
Increased awareness about local/Mainland society	2.5	0.02	3658	6.3	48.1	33.3	11.1	1.3
Enlarged social circle	2.0	0.02	3656	3.0	24.6	45.5	23.1	3.9
More collaboration with colleagues	2.2	0.02	3661	2.9	38.1	40.3	16.7	2.0
More collaboration with teachers in other schools	1.9	0.02	3661	1.7	19.4	50.7	24.4	3.9
More collaboration with other organizations	1.9	0.02	3657	1.7	20.6	50.2	23.5	4.1
Strengthened communication with parents	2.0	0.02	3654	2.4	23.9	47.9	22.2	3.6
Strengthened communication with students	2.3	0.02	3658	4.5	41.2	37.2	14.7	2.4
Strengthened communication with school	2.2	0.02	3659	3.5	37.6	41.0	15.4	2.6

6.2.5 Obstacles and difficulties faced by teachers

The difficulties described by primary school heads, teachers and IT team members are similar (School Heads Questionnaire item 18, IT Team Members' Questionnaire item 4 and Teachers' Questionnaire item 6). The main problems cited by the school heads were teacher workload, teachers lacking skill to apply IT to education, lack of suitable educational software (also cited as a major obstacle in the Preliminary Study) or IT teaching resources which mean that teachers have to spend time preparing their own materials, and insufficient computer resources. 55.8% of the school heads also indicated that the existing curriculum is not conducive to IT applications inside the classroom, which was also supported by 55.4% of the teachers, although relatively few rated this as a serious or very serious problem. The major difficulties encountered by teachers when using IT in their teaching were heavy workload (identified by 87.3%) and insufficient time (76.8%). The workload problem was also rated highly by the IT team members (80.7% for their own workload and 84.7% for that of their colleagues). This was supported in the focus group interviews, where they mentioned that effective use is also restricted by large class size, which makes it difficult to conduct interactive exercises.

> *It's just not possible for one teacher to monitor the behaviour of 40 students. Some of them just play on-line games or ICQ by themselves.*
>
> *We did try to have some interactive exercises with the students in the class, but it is extremely difficult for one teacher to manage 40 students as you have no idea of what they are doing behind the screen.*

They also mentioned the difficulties of finding appropriate materials and resources within the limited time they have available:

> *Teachers in Hong Kong need to take up more than thirty lessons every week, together with students' problems, other school administrative duties, sometimes we need to attend common courses, foundation courses etc. On top of that, we need to squeeze time to prepare software for class. I think the workload is very heavy and it's difficult to allocate the time required.*

> *Should we want to use more interactive teaching materials, we need time to gather additional and updated information from various IT sources, need time to put them onto the Internet and need time to learn new IT techniques to do so.*

> *As for teaching software, we know that there are plenty of resources or packages available on the Internet or elsewhere, but the problem is we have to teach at least four subjects every day, you ask us to search all these by ourselves from the Internet, time is really tight.*

It is interesting to note that in the school heads' interviews the same problem was discussed. This is why the school heads felt strongly that the position of IT coordinator should be retained, not necessarily in the sense of a person to provide technical coordination, but as a resource person to assist in the preparation and location of suitable teaching materials.

Even given the substantial percentages of teachers who have attained IIT, as reported above, 66.2% of teachers still think of lack of knowledge or skills as being an obstacle and 77.7% of the IT team members believe this to be a problem, even though in both cases relatively few think of it as a serious/very serious problem. Of particular interest is the fact that 65.5% of the IT team members rated their own IT knowledge/skill inadequate for promoting IT in education effectively. Another problem, indicated by 60.2% of the teachers and 77.6% of the IT team members, was insufficient computers. Lack of interest was rated relatively low as a reason but, nevertheless, is still high when considering that 40.5% of teachers still cite lack of interest as an obstacle and 69.7% of IT team members rated other teachers' lack of interest as an obstacle to their being able to promote IT in education effectively. Overall, however, none of these was seen as being particularly serious by teachers or IT team members, with less than half of the respondents rating most of them as serious or very serious.

In the teacher focus group interviews, a number of barriers have been mentioned that discouraged a more interactive student-centred approach to ITEd by teachers. Most of the comments were to the effect that they could not do much because of time and workload constraints:

> *Teachers in Hong Kong need to take up more than thirty lessons every week. Together with student's problems, other school administrative duties, sometimes, they need to attend common courses, foundation courses, etc. on top of that, they need to squeeze time to prepare software for class. I think the workload is very heavy and it's difficult to allocate the time required.*

> *Should we want to use more interactive teaching materials, we need time to gather additional and updated information from various IT sources, need time to put them onto the Internet and need time to learn new IT techniques to do so.*

As illustrated in the following quotations there were some other reasons why many teachers do not feel they are able to make more effective use of IT for other purposes:

> *All teachers can manage PowerPoint but it is limited to presentation and is non-interactive. Few teachers can use interactive software in their teaching.*

> *The training courses are too technical and not related to teaching, so we are not able to make use of the knowledge learnt in school...By and by we will forget what we have learned, and that will diminish the value of our training.*

> *Teaching materials from publishers have improved a lot in recent years, but some of them are still not comprehensive and interactive enough.*

> *Hardware we bought five years ago becomes too slow and incompatible with the new software.*

> *The curriculum and examinations limit the flexibility of using IT in Education. Teachers cannot freely and fully utilize the information available for teaching activities.*

Another obstacle is that teachers, especially those teaching in schools situated in the neighbourhoods of poorer socio-economic areas, claimed that they have to spend a lot of time in tackling disciplinary and management issues, hence IT is given less priority. It was clear from the focus group interviews that most of the primary school teachers interviewed are willing to put in extra time and effort to actions that will improve the quality of their teaching, but in the case of IT many of them have yet to be convinced that ITEd gives returns in keeping with the amount of effort that is required to use it well, as exemplified by the following comment from a teacher focus group interview:

> *… how teachers can make it depends on how much time and space are given to them. I believe that teachers are willing and competent to do it. But, a lot of times, there are just too many things happening. When you think of IT at one moment, you are not able to manage others at the same time. It is a wrong perception that IT can make everything happen immediately when you formulate the policy. It is not that simple, it takes time.*

In addition to these reasons, many of the school heads interviewed expressed the concern that the students' home backgrounds and family education can influence the way in which the teachers design teaching activities and particularly homework:

> *… since most of the families in this district belong to lower-income groups, the percentage of students having computers at home is not high, maybe around half to one-third. ... We have a considerable number of students who are newcomers from the Mainland. Most of them do not have computers at home. For some lower form students, they already know how to use the Internet before doing computer classes, probably because they have computers at home. Teachers will take this into consideration when designing teaching activities.*

This was particularly the case in two or three of the primary schools visited that were in relatively poor socio-economic areas where the extent of home computer ownership and the support of parents were not so high. One example from the teachers' focus group interviews was the following teacher's concern that even though only a few children do not have computers at home, their lack of the knowledge that could be expected of children with home computers created obstacles to effective use of IT in the lesson:

> *For example, last week, I taught sending of emails. Most of the students have computers at home, only a small portion does not. For those who have computers at home, they are already aware of how to send emails. But, for those who do not, they do not know how to log-in, and not even how to use yahoo.com. I assisted them to register. They had problems with registration, and logging in. ... So, the whole class was affected. This topic was planned to be finished in 2 lessons, in the end, it took 3 lessons. ... So, if they have computers at home, that really can help students to learn easier.*

It is interesting to note, however, that this perception contradicts evidence reported elsewhere that high percentages of children reported having computers at home and that even those without their own computers seem to think it is not a problem because they can access them at friends' homes or other places. Therefore, it appears that while some school heads and teachers have the view that they should not encourage out-of-school use because it disadvantages those who do not have computers at home, it might in fact be an effective strategy to encourage students to make use of IT for study purposes outside school hours.

The students, on the other hand, did not indicate any major obstacles to their use of IT at home for their learning (Students' Questionnaire item 26). However, this is more likely to be due to the fact that they have very little requirements to use computers at home for teaching and learning.

6.3 Curriculum, pedagogy and resources

This section begins by looking at the primary school teachers' beliefs about IT in education, particularly their primary objectives for using IT in their teaching. Their common beliefs are then used as a basis for examining what occurs in actual practice. This examination focuses on the actual hardware and software that are used and the ways in which these are used, in order to examine whether these practices are in fact conducive to promoting student-centred learning and the development of higher-order thinking skills through the use of IT. Some interesting comparisons are made between the primary school heads' perceptions of what is happening in the classroom and the teachers' and students' descriptions of actual practices. The section also examines schools heads' and teachers' perceptions of the impact of IT on the curriculum and teaching approaches, and finally considers the support needs seen as priorities by different stakeholder groups.

6.3.1 Teachers' beliefs about ITEd

Since teacher beliefs are fundamental to pedagogical practice (Gregg, 1995) this section will begin with a discussion of teachers' perceptions of and beliefs about the actual and potential impacts of IT on their teaching, as well as an examination of the matches or mismatches between their beliefs and their actual practices. While there are some interesting results reported below regarding teachers' perceptions of IT in education, it is also worth noting that at this stage of the initiative there is no overwhelming support with respect to perceived benefit in using it for assessment.

When we examine the primary school teachers' primary objectives for using IT in teaching (Table 6.16, Teachers' Questionnaire item 11), we can see that the majority say or think that they should place high priority on objectives like enhancing teaching effectiveness (81.7%) and providing students with more opportunities for self-learning (84.4%). Objectives concerned with communication and collaboration are given relatively lower priority: communication among students (49.3% agreeing/strongly agreeing that this is a primary objective), communication between students and teachers (52.6%), communication between school and parents (51.7%) and opportunities for students to work collaboratively (52.2%). It appears, therefore, that their espoused thoughts are at least to some extent aligned with student-centred learning – which may well be seen as a positive sign since it is necessary for them to believe this before they can actually put it into practice.

Table 6.16: Teachers' primary objectives for using IT in teaching (Teachers' Questionnaire, Q. 11)

Objectives	Mean (0 – 4)	SE	N	% of teachers choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
To realise effects that can only be achieved by using IT	2.7	0.01	3599	10.0	54.5	28.4	6.5	0.7
To enhance teaching effectiveness	2.9	0.01	3641	13.7	68.0	16.7	1.5	0.2
To strengthen communication among students	2.4	0.02	3616	5.3	44.0	40.1	9.7	1.0
To provide more opportunities for student to work collaboratively	2.5	0.02	3621	4.9	47.3	38.3	8.6	1.0
To strengthen communication between teachers and students	2.5	0.02	3624	5.9	46.7	38.0	8.2	1.2
To strengthen communication between the school and parents	2.5	0.02	3619	5.9	45.8	38.3	8.4	1.6
To provide students with more opportunities for self-learning	3.0	0.01	3645	20.8	63.6	13.8	1.6	0.2
To provide students with more opportunities for self-assessment	2.6	0.02	3621	8.6	53.4	32.9	4.4	0.7
To assist students with learning difficulties or special education needs by specifically designed software/hardware	2.7	0.01	3616	9.6	53.0	32.0	4.6	0.9
To assist the development of gifted students by using specifically designed software/hardware	2.7	0.01	3617	11.5	53.3	30.4	4.0	0.8

However, as can be seen from Table 6.17 (Teachers' Questionnaire item 14d), when it comes to actually describing their use of IT in the lessons with which they were the most satisfied, the primary school teachers' paradigm still seems to be very much knowledge based, with very high proportions seeing their main roles as being to transmit knowledge (92.4%), provide learning materials and activities to enable students' understanding of subject content (87.9%) and teaching new knowledge (87.7%). On the other hand only around 60% emphasised student engagement in problem-solving, information searching or creative tasks. Compared to the results of the parallel item on the Preliminary Study Questionnaire, it can be seen that there has been very little change in the teachers' mean ratings for seeing their roles as transmitting knowledge to students and allowing students to do drilling exercises with computers and providing appropriate learning materials and activities to enable students to understand the subject content. However, there are small increases in the mean rating for engaging students in small group activities for problem analysis and information searching, from 3.2 (on a scale of 1 to 5 in the Preliminary Study) to 2.5 (on a scale of 0 to 4 in the Overall Study). It is interesting to note that the lowest rating was given to the use of drilling exercises, which may be an encouraging indication that they are moving away from the belief that this is the most effective use of IT, although this item also had one of the lowest mean ratings in the Preliminary Study.

The patterns of teachers' use of IT are reinforced by the students' perceptions of the lessons using computers they liked the most (Students' Questionnaire item 13d). When asked to describe the teachers' roles during these lessons, the most common were transmitting a lot of correct knowledge (rated as agree/strongly agree by 88.2% of P3 and 82.8% of P6 students), teaching new knowledge (78.7% and 80.8%), and providing appropriate learning materials and activities to enable understanding of the subject content (72.2% and 71.2%). The teacher's role in providing drilling exercises was described by 71.8% of P3 students but only 57.2% of P6. Similarly the percentage rating provision of opportunities to learn through creative activities was higher for P3 (71.9%) than P6 (57.5%). Engagement in small group activities in problem analysis and information searching was rated highly by 60% of P3 students and 57.3% of P6.

Table 6.17: Teachers' perceptions of their main roles in lesson with IT application that they were most satisfied (Teachers' Questionnaire, Q. 14d)

Roles	Mean (0 – 4)	SE	N	% of teachers choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
Transmit correct knowledge to students	3.2	0.01	3598	32.9	59.5	6.5	0.9	0.2
Allow students to do drilling exercises with the computers	2.2	0.02	3532	4.5	40.0	33.9	17.2	4.4
Provide appropriate learning materials and activities to enable students to understand the subject content	3.1	0.01	3589	19.5	68.4	10.6	1.2	0.3
Engage students in small group activities in problem analysis and information searching	2.5	0.02	3538	9.5	49.1	27.3	10.0	4.2
Provide opportunities for students to learn through creative activities	2.6	0.02	3551	11.3	50.4	26.3	8.4	3.6
Teach students new knowledge	3.1	0.01	3571	22.1	65.6	10.2	1.9	0.3
Provide diversified exercises/practices	2.8	0.02	3559	16.8	58.1	18.3	5.2	1.7

From the teacher focus group interviews it was found that a large proportion of teachers think that using PowerPoint means they have already met the target of using IT. Certainly this was supported by observations during the classroom visits, in which 37 out of the 74 classes observed (of which 66 used some IT) used PowerPoint, with a further 19 using CD-ROMS, compared to only 8 in which some Internet browsing occurred during the lesson. A lot of teachers actually see IT as a way to make lessons more interesting or attract students' attention rather than as a tool to facilitate student-centred learning. The following typical quotations from teachers' interviews clearly illustrate further that teachers are tending to think about IT in this way.

> *IT can help make teaching more interesting to students as a variety of tools can be used, images, multimedia tools can make learning more interesting.*
>
> *We show PowerPoint, pictures, graphics and charts and use on-line exercise games. They help to illustrate the content clearer and attract students' attention more easily.*
>
> *With the help of IT devices we can attract children's attention easier.*

In the interviews with representatives from the tertiary education sector and some of the EMB representatives interviewed, it was reiterated further that the majority of teachers are tending to use IT as a presentation tool to support teacher-centred learning than as a means of facilitating more student-centred learning.

> *There are many teachers who are very competent in the technical aspects but very weak in applying it in teaching and learning...More needs to be done to get teachers to rethink how they actually use IT in class, how they actually teach. (Tertiary institution representative)*
>
> *Unless the system issues are in place and aligned, IT by itself isn't going to change education. It's a complement. It's the 'good ordinary' teacher who needs as much as possible support and persuasion to use IT in effective ways – and the problem is that these are often the teachers that are using IT just as PowerPoint – which is probably just a waste of the teacher's time! (Policy maker)*
>
> *In terms of training the progress has been pretty good, but in terms of professional development we still have a long long way to go – at present a significant number of teachers still look upon IT as just a presentation skill – still a lot who have not grasped the*

picture of what IT can do for their students – still have to do a lot along this line. (Project Owner)

Some indicated that they know there is more to ITEd than using PowerPoint presentations but find it difficult or even do not know how to do more. There is still a perception that good use of IT in teaching means good use of visual and audio impact such as animation facilities, rather than good pedagogical use of IT as a tool to stimulate thinking or facilitate students to construct their own knowledge. Lack of resources (hardware and software) has most commonly been quoted as the main reason for the didactic use in the classroom.

We are restricted by the limited facilities in the classroom. It is difficult to achieve the desired level of interactive teaching. Students' participation is still very limited unless the class is conducted in the computer room.

Some publishers would provide additional exercises but most just provide an electronic version of the textbook. It would be very helpful should they produce some activity-based content.

While the next quotation also illustrates the above point, it is interesting to note that this teacher seems to believe having several students share one computer is not good practice, when in fact in terms of student-centred pedagogy such as social constructivism it is a very important practice (Papert & Havel, 1991; Vygotsky, 1978).

Resources are still very limited. It is still hard to work out the effect of interactive teaching and learning. Several students share one computer. Sometimes the situation can be even worse. What teachers can do now is using IT for presentation only, not interaction.

In the post-classroom observation interviews most teachers reported that they had felt satisfied with the outcomes of the lesson, and admittedly they probably would have had a better understanding of the context and background than the observers to enable them to judge this. However, some questionable practices were observed with which the teachers appeared to be satisfied. One example was a senior teacher who lacked IT skills. Before the lesson she had spent a whole day just to find a particular website relevant to the topic. In the class, she told the children that they had better skills than she did, wrote the website address on the board but almost immediately covered it with the screen before the children had a chance to use it, and left the children to find the site for themselves. She told the children not to ask her for help. Even after the children had located the site, they were left simply to browse it by themselves, without any teacher guidance about what to look for. The lesson lacked clear objectives and focus and no attempt was made to assess or discuss what the students had actually learned from their browsing, yet the teacher gave this lesson a rating of '4' for satisfaction on a five-point scale. This is one example that suggests an observed tendency for teachers to feel overly satisfied with their own performances, which implies there may be a mismatch between what they think is good practice and what is really good use in terms of facilitating student-centred learning.

6.3.2 Actual practices: Curriculum integration

When asked to rate the extent to which IT had been adopted in key learning areas (KLAs), more than 82% of the primary school heads surveyed painted the positive picture that it is indeed used occasionally or always across all KLAs (Table 6.18, School Heads' Questionnaire item 6).

Table 6.18: Extent to which IT had been adopted in teaching in different KLAs (School Heads' Questionnaire, Q. 6)

KLA	% of school heads choosing the option				N
	Always	Occasionally	Rarely	Never	
Chinese Language Education	31.2	65.4	3.4	0.0	618
English Language Education	36.1	61.5	2.4	0.0	620
Mathematics Education	35.9	60.4	3.7	0.0	618
Science Education	43.9	52.7	2.8	0.7	579
Technology Education	65.5	30.2	3.0	1.3	559
Personal, Social and Humanities Education	24.3	63.2	10.7	1.9	540
Physical Education	1.3	33.8	57.7	7.2	615
Arts Education	17.5	64.9	17.2	0.5	618

With the exception of Physical Education, which is understandable because of the nature of the subject, more than 82% of the school heads indicated that IT had been adopted in teaching occasionally or always in the KLAs. More than 95% indicated that it had been used occasionally or always in the KLAs of Chinese Language (96.6%), English (97.6%), Mathematics (96.3%), Science (96.6%) and Technology (95.7%). Of course, however, it is important to note here that these items were concerned only with the extent to which IT was used, not with the nature of its use.

The actual practices reported by the primary school students (Table 6.19, Students' Questionnaire item 6), however, suggest that the use of IT is much lower across the curriculum areas than implied by the school heads, with very low percentages of students reporting that IT had been used IT in lessons in the past month, except with the obvious exception of Computer Studies where 79.2% of P3 students and 88.3% of P6 students reporting it having been used IT in the past month. 35% of P3 students and 43.9% of P6 students said that computers had been used in their Chinese Language classes (compared to 23.7% of students in the Preliminary Study). The other more frequently reported subject areas were English language (34% of P3 and 36.9% of P6 compared to 20.5% in the Preliminary Study), Mathematics (28.5% and 35.6% respectively compared to 22.6% in the Preliminary Study) and General Studies (25.8% and 37.2% compared to 31.8% in the Preliminary Study). All of the other subject areas were indicated by 19% or less of the students, as was also the case in the Preliminary Study.

Table 6.19: Subjects having involved the use of computers in the past month as reported by students (Students' Questionnaire, Q. 6)

Subject	P3 (N = 2436)	P6 (N = 2476)
	%	%
Chinese Language	35.0	43.9
English Language	34.0	36.9
Mathematics	28.5	35.6
General Studies	25.8	37.2
Music	7.3	15.2
Computer Studies	79.2	88.3
Putonghua	14.0	13.0
Arts and craft	13.5	19.0
Physical Education	4.8	4.9
Religious Studies	4.3	4.9
Reading/Library	13.4	18.0

Note: Multiple response items

As was mentioned in Section 6.1, in the focus group interviews the students reported that their teachers seldom use computers in lessons and even if they are used it is mostly low level use and by teachers rather than by students. The school heads' figures indicate that IT has been used rather extensively across KLAs but from the students' perspectives it seems not to have been used very commonly and mostly used by teachers when it was used. The following quotations from the student focus group interviews give some insight, from the students' perspectives, about how their teachers had used IT in class. These show clearly that the use was very much teacher directed.

S1: The projector will be put in front, so that classmates can see the projection clearly from their seats in the classroom
S2: After turning on the computer, the teacher will browse the Internet, put a CD-ROM in the computer and then click it. The content of the text book will be shown on the screen; some red words appear with explanation
S3: Some teachers will make the PowerPoint themselves, and show it to us.
S4: Or ETV
S5: Turn on the projector… for example, they will teach us homework or show us some pictures in Art & Craft lesson.
S6: Teachers may ask us to browse certain websites, which means doing homework.
S7: The teachers will run a CD-ROM… there were some questions in the CD, and we answered them.
S8: Teachers of P3 classes always click the computer themselves, they won't let us touch it.
S9: Teacher may think that we will concentrate more if they use computers in lesson.
S10: In Chinese Language lesson, we search historical information. In English Language, we will search text book information.
S11: They will show us some work with Excel, PowerPoint or others.
S12: For example… to use PowerPoint to create a file, teachers will demonstrate it to us once and then delete it and ask us to do it again.

6.3.3 Actual pedagogical use by teachers

The data shown in Table 6.20 (Students' Questionnaire item 7) add further strength to the observation that more is being said about the use of IT in teaching than actually done. Whereas very high percentages of school heads reported at least occasional use, the student data do not suggest that it is used very often. 27.4% (P3) and 41.9% (P6) reported that their teachers had not used IT at all in the previous month or had only used it two or three times during the month. Only 41% (P3) and 34.9% (P6) of the students reported their teachers having used IT in class two or three times per week– out of a total of more than 30 lessons per week – or almost daily. However, this is already a big improvement since the Preliminary Study, in which only 15.7% of P6 students had indicated that their teachers had used IT in class for more than two or three lessons a week. In the teacher focus-group interviews the teachers all claimed that they had reached the target set by the Government of using IT for 25% of their curriculum. However, during the school tours there was little evidence observed of widespread computer use by teachers in primary schools.

Table 6.20: Frequency of computer use by teachers during class in past month as reported by students (Students' Questionnaire, Q. 7)

Frequency	P3 (N = 2392)		P6 (N = 2457)	
	%	Cum. %	%	Cum. %
Almost daily	11.9	11.9	9.3	9.3
2-3 times a week	29.1	41.0	25.6	34.9
About once a week	31.6	72.6	23.2	58.1
2-3 times per month	14.4	87.0	26.8	84.9
Not at all	13.0	100	15.1	100
Total	100	-	100	-

The patterns described above are reflected further in the qualitative data collected. While teachers said in the focus group interviews that one of the main reasons for using IT was to invoke student interest and make learning more exciting, interesting and motivational – which is not necessarily an appropriate way of conceptualising the role of IT – it was noted during classroom observations that some children were losing interest over a period of time and in some cases were quite obviously bored during lessons where the teacher was using IT. In fact, in the student interviews it was expressed by some, particularly P6, students that they would prefer their teachers to use IT less because of the time wasted by the teacher setting up and operating the technology. In the teacher focus group interviews, teachers mentioned that, because children are accustomed to the visual stimulation and excitement of games, they are not so attracted by a simple computerised presentation. In fact, as the students' comments are already beginning to suggest, it is probably likely that this kind of novelty effect may wear off as IT becomes more and more commonly used for this purpose. The following quotes from the teacher interviews clearly illustrate this point.

> *The use of IT in class initially stimulates the students' desire to learn, but not in the later stage when they are accustomed to it.*
>
> *Students began to lose interest and excitement. The only way to maintain their interest is to use more sophisticated software for teaching, e.g. Flash, animation, Dreamweaver etc. However, their application is limited.*

Nevertheless, it is somewhat encouraging that 87% of P3 and 84.9% of P6 students said their teachers had used IT at least two or three times a month other than in computer lessons – this is an improvement on the figure of 61% of teachers reported in the Preliminary Study as having used it in non-Computer Studies subjects.

In the School IT Survey data (item 4d), high use was reported of word processing and presentation software, followed by spreadsheets. This reflects a focus on presentation rather than on exploration and activity. Graphics design software was reported as being used to some extent but the use of rich media and interactive software still appears to be not very common in the primary schools surveyed.

Teachers' self-reports of the software they are using (Table 6.21, Teachers' Questionnaire item 12) are consistent with other data suggesting that presentation and word processing software are being used a lot, along with software used by textbook publishers. Relatively low use has been reported, however, of simulations or educational software other than that provided by the textbook publishers, which in many instances appear to be only summaries of the textbooks. As mentioned previously, 37 out of the 74 classes visited (of which 66 were observed using IT in lesson) used PowerPoint in the lesson, 19 used CD-ROM and only 8 had browsed the Internet during the lesson.

Table 6.21: Frequency of software used in teaching reported by teachers (Teachers' Questionnaire, Q. 12)

Software	**% of teachers choosing the option**				**N**
	Always	**Occasionally**	**Rarely**	**Never**	
Word processing software	69.1	24.1	5.3	1.5	3660
Spreadsheet software	19.0	44.2	27.2	9.5	3648
Database software	19.7	40.6	27.8	12.0	3638
Presentation software	40.2	39.0	15.3	5.4	3647
Communication software	31.2	37.6	23.5	7.7	3641
Web design software	13.2	37.5	36.6	12.7	3637
Audio/video editing software	11.0	33.7	38.4	16.9	3629
Graphics editing/drawing software	17.9	41.4	29.3	11.5	3635
Multi-media software	23.7	46.4	22.7	7.2	3639
Simulation software	5.0	28.7	43.0	23.4	3616
Practice and drill software	11.5	41.6	34.5	12.4	3629
Educational software developed by yourself	13.6	37.6	31.6	17.3	3642
Educational software developed by your school	9.5	37.5	32.4	20.7	3627
Educational software developed by EMB (Formerly ED)	6.5	37.0	39.1	17.5	3621
Educational software or teaching materials obtained from HKedCity (HKedCity.net)	13.3	42.7	30.7	13.3	3628
Educational software developed by other government departments/voluntary organizations/tertiary institutions	6.7	36.1	39.2	18.0	3613
Educational software provided by textbook publishers	34.4	44.3	16.6	4.7	3639
Educational software developed by other software vendors	11.4	45.2	32.0	11.4	3604

From Table 6.22 (Teachers' Questionnaire item 8) it can be seen quite clearly that teachers are using computers in primary schools, especially for searching for information (86.9%) and preparing teaching materials (81.2%), with more than 81% (about 20% more than reported in the Preliminary Study) using it occasionally or always for these purposes. In the Preliminary Study, (Table 2.3.21, p. 71, item 5) there was a similar item to one of those above, concerned with 'Designing classroom activities/assignments that require the use of IT'. The response rate of 56.6% in the Preliminary Study compared to 71.1% rating occasionally/always on the item of the present study 'designing inter-class activities and assignments' gives some further support that more teachers are using computers than before. IT definitely seems to have become a more regular part of their culture and their daily routine. However, there are still less than 39% of respondents using it to communicate with students (38.6%) or colleagues (35.6%) in ways that could enhance effective collaboration. Also, from the teacher focus group interviews it was evident that most of the teacher use is still limited to the use of presentation software although a small percentage said they give project-based homework to their students. However, when we look at the teachers' actual quotations, there seems to be a lot of mention of the fact that they use it for project-based work but not much detail about how they actually use it, which suggests that they instruct the students to go and find information on the Internet rather than structuring the learning experience, and there still seems to be some emphasis on learning the IT techniques rather than on higher-order thinking skills.

> *Students are asked to submit reports on special projects so that they can learn different IT techniques in the process.*

> *Students were willing to accept the use of IT. They often go to the computer room and search for information to do project-based learning.*

Table 6.22: Nature of use by teachers of IT in teaching-related activities (Teachers' Questionnaire, Q. 8)

Nature of use	**% of teachers choosing the option**				**N**
	Always	**Occasionally**	**Rarely**	**Never**	
Preparing teaching notes/course materials	29.5	51.7	16.0	2.8	3666
Searching for information, new pedagogy, teaching materials, etc.	35.3	51.6	11.8	1.4	3673
Designing inter-class activities and assignments	22.1	49.0	23.5	5.5	3656
Managing, administering and collecting student tests	14.5	28.5	32.7	24.3	3637
Discussing and communicating with students	6.3	32.3	40.5	20.8	3641
Discussing teaching-related matters with other teachers	5.5	30.1	41.6	22.9	3646
Carrying out collaborative projects with other schools	5.4	24.8	30.4	39.5	3619

However, the following teachers' quotes show some encouragement that at least some teachers have a broader view of how IT can be used for project-based learning, although they also express concern over students' ineffective use of technology for this purpose:

> *The next step is that students can search for information, manage data and find out answers for something unknown via the use of the computer.*

> *As information is readily available, students tend to copy and paste information, and many times just do not think about the problems.*

When we look further into the teachers' reflections on the lessons with which they found their use of IT the most satisfying (Table 6.23, Teachers' Questionnaire item 14b), it can be seen that the actual use is still more related to teacher-dominated than to student-centred learning, as was the case reported in the Preliminary Study. The most frequently reported use of teacher time was in explaining and demonstrating to the whole class, with 73.1% of teachers reporting to have done this all/most/half of the time. On the other hand, 61.1% of the teachers reported to have students working individually with computers for none or only a small proportion of the time, and 79.3% reported that none or only a small proportion of the class time was spent on students working in groups with the computers. There appears to be very little paradigm shift reflected in this item when compared with the Preliminary

Study result, on which the findings were almost the same as reported here. When we look at the kind of hardware and software used by teachers in the lessons with which they were the most satisfied we can see that these are again more presentation related. This supports the perception that, even in the lessons with which teachers feel the most satisfaction about their use of IT, they are still talking about didactic types of instruction, providing very little evidence that they are supporting student-centred learning or Internet use in class.

Table 6.23: Teachers' allocation of time for different purposes in lessons in which they were most satisfied with IT application (Teachers' Questionnaire, Q. 14b)

Purposes	% of teachers choosing the option					N
	All of the time	Most of the time	Half of the time	A small of proportion of time	None of the time	
Teacher explaining and demonstrating to whole class	3.1	30.5	39.5	26.0	1.0	3623
Students working individually with the computers	0.6	12.1	26.3	41.9	19.2	3487
Students working in group with the computers	0.5	5.6	14.6	42.3	37.0	3435

When students were asked to report their perceptions of the lesson using computers that they like the most (Students' questionnaire item 13c), 60.4% of students in both grades reported that their teachers had been explaining and demonstrating to the whole class for at least half of the time. On the other hand, 50% of P3 and 60.4% of P6 students said students had worked individually with the computers a small proportion or none of the time and 66.5% of P3 and 74% of P6 students said students had worked in small groups with the computers a small proportion or none of the time.

The qualitative data also corroborate the findings from the quantitative data that the most common practices are still teacher-centred. One of the teachers made the following comment, which may explain the slow process of paradigm change:

> *Despite the heavy promotion of IT in Education, some teachers still possess traditional concepts of teaching and stick to the old teaching culture. I believe this makes it hard to make changes.*

There were some descriptions in the teacher interviews of more creative use of IT but this was more commonly found in learning areas (like music and art) where richer resources and examples are available. The following example illustrates this:

> *IT is really useful for Art lessons. ... Many times, I will ask students to do some research first to arouse their learning motivation. When they go back home, they will really work on that. e.g. if I try to introduce sculpture, I ask them to collect some information first. It turns out that they can find out many different sculptors, afterwards, it can turn to a small-scale project. I think this really helps to broaden their sphere of learning.*

However, not many mentioned any creative use in any of the other Key Learning Areas. One teacher's comment is typical of the reasons given for not doing so:

> *I think the effect will be better for science subjects but not language subjects. Say Chinese, students just key in the words, and there is no chance for them to practice writing. Their handwriting becomes worse. In addition, communication and presentation skill need practising. They need to speak more and no one can help. You need face-to-face conversation in order to achieve that.*

As far as teachers' reporting of use of IT in student assessment is concerned (Teachers' Questionnaire item 9a), there is little evidence that this is a common practice or that most teachers perceive it to be a worthwhile thing to do. Only 48.6% of teachers said that they had used IT for processing student assessment data and 41.7% that they had used it for evaluating students' learning progress and efficacy.

Only around half or less of the teachers reported that saw benefits in using IT for evaluating students (Teachers' Questionnaire item 9b). 56.7% said it allows greater flexibility in both time and place for evaluating students, 51.3% that it is easier to follow up on student evaluation, 45.9% that it is easier to relate evaluation results to students' weaknesses, 45.1% that in enables students to conduct self-review and self-evaluation on their own initiative, and 44.1% that it supplements existing evaluation tools. More teachers seemed to be aware of the benefits of using IT for processing student evaluation data (Teachers' Questionnaire item 9c), 73.2% saying that it is faster to obtain the evaluation results and 60.5% that it allows for more accuracy in evaluation results. However, only 48.6% agreed that student performance can be evaluated in greater detail, 45.2% that it is easier to follow up on student evaluations and 43.4% that it is easier to relate evaluation results and students' weaknesses.

When asked to comment on the use of IT to cater for individual students' needs (School Heads' Questionnaire item 7), 98.2% of the primary school heads indicated that IT had been used in certain subjects for practice or individual counseling to strengthen learning outcomes, but only 45%-59.5% reported any cases of tailoring for various kinds of individual differences in the classroom. Nevertheless, there is a marked increase (from 14-20% reporting this kind of use in the Preliminary Study to 45%-59.5% in this Study).

6.3.4 Use of school website/intranet

When asked how they use their school website (Students' Questionnaire item 14b), the students reported that the highest use was in reading announcements, although only 54.9% and 59.4% of P3 and P6 students respectively reported doing this occasionally or always (Table 6.24). There is no evidence suggested by the students' reporting that the school website is being used widely in the teaching and learning process for promoting interaction or tasks requiring higher-order thinking.

Table 6.24: Frequency of student use of school website for different purposes (Students' Questionnaire, Q.14b)

Purposes	P3					P6				
	% of students choosing the items				N	% of students choosing the items				N
	Always	Occasionally	Rarely	Never		Always	Occasionally	Rarely	Never	
1	23.3	31.6	19.7	25.5	1603	18.5	40.9	27.2	13.4	2247
2	17.4	22.5	19.9	40.2	1600	9.4	20.6	32.8	37.2	2244
3	15.5	15.8	17.6	51.1	1599	7.0	14.7	28.2	50.1	2243
4	19.9	19.6	18.0	42.6	1597	9.8	21.0	24.9	44.4	2244
5	15.5	17.0	17.7	49.9	1597	5.1	12.7	24.0	58.3	2242
6	13.0	13.2	17.9	56.0	1595	6.8	12.8	22.7	57.7	2238

1. Reading announcements or searching for information released by the school/interest clubs
2. Downloading learning materials (e.g., notes, references, assignments, suggested answers for tests/exercises)
3. Uploading assignments/exercises
4. Participating in online tests/examinations
5. Checking the grades or feedback on your assignments given by the teachers
6. Participating in forums/discussion groups

6.3.5 Perceived impact of IT on teaching

Data were collected to describe the extent to which the school heads and teachers had perceived IT to have had an impact on teaching and the curriculum. The primary school heads seem to have high perceptions about the impact that has occurred. The highest perceived impacts (School Heads' Questionnaire item 9d) are the integration of IT into the curricula of different subjects (96.6%) and increased project-based and collaborative activities (91.6%). Lower, but still more that 75%, are strengthened collaboration among different subjects (77.7%) and increased practicality in curriculum (75.8%). These are followed by facilitated curriculum integration (67.7%), requirement for more adjustments to class schedule (56.9%), increased collaborative programmes with other schools/countries (31.8%) and reduced teaching hours of other subjects (27.8%). These patterns are almost identical to the corresponding item in the Preliminary Study.

As regards the teachers' perceptions of the impacts of IT on their teaching (Teachers' Questionnaire item 3a), more than 74% agreed or strongly agreed that the biggest personal impact on their teaching has been a substantial improvement in the IT resources for themselves (74.5%) and their students (74.3%) and an increase in the percentages of teachers in their schools using IT for teaching (78.4%). However, as was reported earlier, the students themselves did not report satisfaction with the availability of resources. Furthermore, Teachers' Questionnaire item 3b indicates that 80% said they have made more use of IT resources for teaching, 74.2% have made use of it to enhance their teaching effectiveness, 63.5% have used it to assist in teaching-related work such as processing student attendance records, but only 47.7% said they have requested their students to use IT in completing their assignments. Thus, again, the evidence supports that teachers are using IT but mostly for preparation and administration and teacher-centered kinds of actions, while less than half are actually requesting students to use it in their work. It is particularly important to note that there is some discrepancy between what the school heads perceive is happening and what the teachers and students report as happening.

6.3.6 Resources and support

As reported in Section 6.1.1, most of the schools' IT budget expenditure was on the infrastructure and technical aspects, including hardware, consumables and technical support. The high priority given to infrastructure is substantiated by very high percentages of teachers indicating a wide range of hardware and peripherals available in their schools (Table 6.25, Teachers' Questionnaire item 2a). However, when this is compared to the actual use, it can be seen that, apart from desktop computers, the Internet and black-and-white printers, the actual use of some items is rated relatively low. Granted that some of these are fairly specialised pieces of hardware that would not normally get a lot of use, but others, such as online teaching and even the use of educational software, are considerably lower and this could be a cause for concern.

Table 6.25: Availability and extent of use of IT facilities/services by teachers in schools (Teachers' Questionnaire, Q. 2a)

Facilities/Services	% of teachers indicating availability	N	Extent of use in previous year % of teachers choosing the option: Always	Occasionally	Rarely	Never	N
Desktop computer	96.5	3642	69.8	24.6	5.0	0.5	3403
Notebook computer (for use in school)	88.4	3606	10.2	32.9	38.0	18.9	3086
Notebook computer (for take-home use)	38.8	3477	8.8	10.2	24.0	57.0	1284
Internet	98.9	3631	59.9	31.4	7.7	1.0	3461
E-mail account provided by school	92.9	3628	28.5	34.6	30.6	6.4	3247
File server storage space	98.3	3614	54.4	27.9	14.0	3.7	3409
Digital camera/video camera	97.0	3622	15.3	40.1	28.6	16.0	3402
Printer (black-and-white)	98.6	3642	74.1	20.8	4.2	0.9	3473
Printer (colour)	98.0	3635	41.0	38.1	16.4	4.5	3440
Visualiser	95.2	3621	22.5	40.3	27.5	9.7	3323
CD Writer	98.0	3619	10.5	35.2	33.5	20.8	3414
Educational Software	98.7	3624	32.2	51.3	14.5	2.0	3450
Online teaching/learning platform	86.6	3461	17.2	47.4	29.1	6.3	2875

When teachers were asked to rate the sufficiency of the school's IT facilities to support their teaching (Teachers' Questionnaire item 2b), 52.1%-74.6% indicated that it was quite or very sufficient. The only notable exception to this was curriculum support, which less than half of the respondents (47.4%) rated as sufficient. This may offer some explanation as to why integration and further use has not occurred to the desired extent. However, a different picture can be seen from the students' perceptions of the same facilities with, in most cases, less than 50% of students saying the facilities were sufficient (Students' Questionnaire item 5) – the only exception being 58.5% of P3 students satisfied with the type and number of computers. P6 students (52.3%) were, overall, less satisfied than their P3 counterparts, which may be due to the fact that they have greater need for resources and support.

Those teachers who used resources and support services provided by EMB (Teachers' Questionnaire item 5), such as Hotline, Regional Support Services, Information Technology Education Resource Centre and Technical Support Service, generally rated these as satisfactory, but usage was quite low with less than 41% of teachers indicating they had used them. The only exception was HKedCity, which 72.1% of the teachers reported to have used and with which 71.6% of the reported users were satisfied or very satisfied. Students, on the other hand, did not indicate as high a use of HKedCity (Students' Questionnaire item 22). The number who reported having made use of it, or even having looked at it, is quite low (26.7% of P3 and 42.7% of P6), although more than 80% of those who have used it reported it as being average to very helpful (Students' Questionnaire item 22a).

When asked to identify their main sources of support when they encounter difficulties in using IT (Teachers' Questionnaire item 7), the majority of teachers indicated that, other than school-based technical support, they seek it from friends, relatives or other colleagues rather than turning to other sources such as EMB or to self-help strategies. This is a similar pattern to that reported in the Preliminary Study. Students also indicated that most of their support comes from their teachers, friends and relatives (Students' Questionnaire item 25), and this was further supported by data from the Parents' Questionnaire. Students' responses suggested that the highest expectation for support was from their teachers, and a reasonable level of satisfaction was reported.

One more perspective on support was obtained from the Parents' Questionnaire, which suggested that more than half of the parents were willing or very willing to provide resources including time and money to support their children's learning with IT (Parents' Questionnaire item 10).

6.3.7 Needs and obstacles

The School Heads' Questionnaire data (Table 6.26, School Heads' Questionnaire item 19) suggest that the greatest support need in primary schools is for computers and infrastructure, thus implying that resourcing is still perceived by heads as one of the main concerns, above staff development. 84.2% of the primary school heads rated increasing/upgrading of computers and 83.4% rated increasing/upgrading of peripherals as quite or much in need, and 84.5% rated increasing/upgrading of software as being quite or much needed. There are only around 70% of school heads who see quite/much need for supporting teaching-related issues such as integrating IT into the school curriculum (77.2%), using IT in teaching/assisting teaching (70.1%), enhancing the IT skills of teachers (70.2%) and students (68.5%) or using IT to support students with individual needs (70.7%). Relatively little priority was given to supporting developments that would lead to greater collaboration between schools, with the lowest ratings given to sharing experiences with teachers (48.3%) and students (29.3%) from other schools.

Table 6.26: Heads' ratings of support needs in schools (School Heads' Questionnaire, Q. 19)

Needs	Mean (0 – 4)	SD	N	% of school heads choosing the option				
				Much in need	Quite in need	Average	Not much need	No need at all
Integrating IT into the school curriculum	2.9	0.8	621	18.7	58.5	18.4	3.5	1.0
Using IT in teaching/assisting teaching	2.8	0.8	622	17.4	52.7	24.9	3.7	1.3
Enhancing the IT skills of students	2.8	0.9	619	20.5	48.0	22.0	8.2	1.3
Enhancing the IT skills of teachers	2.9	0.9	621	24.8	45.4	23.5	5.6	0.6
Sharing experiences with teachers from other schools	2.5	0.7	621	6.1	42.2	42.8	8.5	0.3
Sharing experiences with students from other schools	2.1	0.8	618	3.2	26.1	48.1	19.4	3.2
Using IT for performing/supporting school administration/management tasks	2.8	0.9	619	20.4	47.3	21.0	9.9	1.5
Increasing the number of/upgrading computers	3.3	0.9	620	48.1	36.1	10.0	4.4	1.5
Increasing the amount of/upgrading computer peripherals	3.2	0.8	617	43.8	39.6	13.1	2.6	1.0
Increasing the number of network nodes in school	2.8	1.1	617	31.1	36.3	20.6	9.1	2.9
Increasing the amount of/upgrading educational software and IT teaching resources	3.2	0.8	620	39.7	44.8	13.9	1.3	0.3
Using IT to support students with learning difficulties	2.9	0.8	619	18.7	52.0	25.9	3.1	0.3
Using IT to provide additional materials to supplement the curriculum for gifted students	2.9	0.8	618	19.9	53.1	23.8	2.6	0.7

From the perspective of the IT team members (Table 6.27, IT Team Members' Questionnaire item 5) the pattern is similar to that of the school heads. The highest percentage rated increasing/upgrading software as quite/much in need (81.2%), followed by increasing/upgrading peripherals (77.9%) and increasing/upgrading computers (76.2%). Again the lowest percentages saw sharing experiences with teachers (42.7%) and students (34.3%) from other schools as being important support needs.

Table 6.27: IT team members' ratings of support needs in schools (IT team members' Questionnaire, Q. 5)

Needs	Mean (0 – 4)	SE	N	% of IT team members choosing the option				
				Much in need	Quite in need	Average	Not much need	No need at all
Integrating IT into the school curriculum	2.8	0.03	586	13.9	56.8	23.8	5.5	0.1
Using IT in teaching/assisting teaching	2.7	0.03	586	14.4	53.9	24.7	6.3	0.7
Enhancing the IT skills of students	2.8	0.04	586	22.7	47.4	22.2	7.4	0.3
Enhancing the IT skills of teachers	2.9	0.04	585	25.6	45.6	23.4	5.4	0.0
Sharing experiences with teachers from other schools	2.4	0.03	586	5.7	37.0	44.8	12.3	0.3
Sharing experiences with students from other schools	2.1	0.04	586	4.3	30.0	41.7	21.8	2.3
Using IT for performing/supporting school administration/management tasks	2.7	0.04	582	18.0	43.0	30.4	8.2	0.4
Increasing the number of/upgrading computers	3.1	0.05	586	42.8	33.4	17.6	5.5	0.8
Increasing the amount of/upgrading computer peripherals	3.1	0.04	586	41.6	36.3	17.9	3.8	0.5
Increasing the number of network nodes in school	2.8	0.05	586	31.7	31.4	24.8	10.4	1.7
Increasing the amount of/upgrading educational software and IT teaching resources	3.2	0.03	586	38.1	43.1	17.1	1.6	0.1
Using IT to support students with learning difficulties	2.7	0.04	586	18.4	44.6	30.4	6.2	0.4
Using IT to provide additional materials to supplement the curriculum for gifted students	2.8	0.04	586	19.9	44.7	29.2	5.9	0.3

Relevant to the discussion of obstacles to effective pedagogical use of IT is the previously-mentioned issue of location of computers in special rooms instead of general classrooms and the notion that 'more is better' in terms of quantities of hardware and software. This was emphasised in the following comment from one of the EMB policy makers interviewed, and was also echoed by the interviewees from the NGOs with parent education and ITEd Project Owners:

> *We have continually been distracted by the perception that we need more hardware, better hardware – so the order will always be hardware, training, curriculum, whereas it should be curriculum, training, hardware – we are so much led by the technology industry now – in retrospect would have put just basic hardware in and much more resources into developing the teaching and learning – notion of one computer per child is the wrong way to go – better to have many computers in the classroom and having students sharing – the best way to force collaborative work. Taking students from the classroom to the computer room is bad pedagogy (but everyone all over the world makes the same mistake).*

Added to this is the issue raised in stakeholders' groups interviews that even the layouts of some computer labs are not conducive to good pedagogical practice:

> *That's another misconception because when I go to schools I always tell them [the teachers], even if you have one computer, you can do a lot with it. You don't have labs for forty, you don't need six labs, three labs or whatever. Schools with those labs don't necessarily do great work... I was shocked actually seeing them. Big, long labs in two rows, two rows against the wall. The teachers! The poor teachers! (Tertiary Institution Representative)*

When students were asked about the kinds of assistance they want when using IT for learning (Students' Questionnaire item 29) the most frequently indicated by P3 students was computer technical support from school after school hours (35.7%) followed by extension of operation hours of computer facilities at public libraries/community centres/youth centres (28.2%) and extension of opening hours of school computer facilities after school (27%). The P6 students also indicated computer technical support from school after school hours (40%) followed by extension of opening hours of school computer facilities after school (37.4%) and extension of operation hours of computer facilities at public libraries/community centres/youth centres (29.9%). Nearly twice as many P6 as P3 students (32.1% and 15.9% respectively) said they would like offers by commercial organisations of special rates for students' purchase of computers.

6.4 School and wider community culture

This section considers various aspects of the school culture and that of the wider community. First it describes the beliefs and visions of the school leaders and IT leaders within the school and the ways in which they are reflected in the school's IT plan. Factors taken into account in implementing IT in the school and the actual roles of the school's leaders can also have an impact upon the school's IT culture, hence these factors are examined along with the interactions between schools and wider community groups in establishing the IT culture. The next section describes the activities that schools have organised to promote an IT culture within the school and the wider community and the final sections examine the extent and nature of the impact of IT on the school and community cultures and factors that can affect them.

6.4.1 School leaders' beliefs and visions

This section will begin with a description of the school leaders' beliefs and visions, since there is evidence to suggest that leadership and the organisational environment have an important impact on the school culture (Fullan, 2001; Senge et al., 2000; Kozma, 2003).

It is an encouraging sign of the emerging IT culture in primary schools that 90.4% of the school heads surveyed said their schools have developed ITEd plans (School Heads' Questionnaire item 14c). 95.9% of the schools reported to have an IT plan or policy (School Survey item 1h) said that they focused in the plans or policy on teacher training/development and teaching, with administration (75.3%) and extra-curricular activities (79.2%) being less common. The most common goals for IT plans (Table 6.28, School Heads' Questionnaire item 5) are concerned with making the learning process more interesting (93.8% rating it as very or quite important), improving students' learning outcomes (87.1%), strengthening students' initiative, independence and sense of responsibility in learning (82.9%) and providing suitable learning activities according to individual needs (75.8%). The least common are strengthening or developing co-operation among students (55%) and providing training to prepare students for further study or future careers (50.9%). These patterns reflect those of the Preliminary Study. While the school heads surveyed in this Study do not seem to have placed the same emphasis on catering for individual students' needs as was reported in the Preliminary Study, where 98% reported it as important or very important, the proportion rating it as very or quite important is still high (75.8%). Interestingly, however, only half of the respondents indicated that the goal of strengthening co-operation among students is important, even though this is an important component of the kind of student-centred learning that can bring about the other goals they did stress as important. Similarly, relatively low proportions think that using IT to improve collaboration between different subjects to enable curriculum integration, or to use it as a way to improve co-operation and communication among the school, parents and community, are important goals.

Table 6.28: Heads' perceptions of importance of goals in formulating School IT plan (School Heads' Questionnaire, Q. 5)

Goals	Mean (0 – 4)	SD	N	% of school heads choosing the option				
				Very important	Quite important	Average	Not very important	Not important at all
a	3.3	0.7	620	41.3	45.8	11.1	1.8	0.0
b	3.4	0.6	623	44.5	49.3	6.3	0.0	0.0
c	3.1	0.7	623	27.0	55.9	15.9	1.3	0.0
d	2.9	0.7	620	19.4	53.4	25.7	1.6	0.0
e	2.6	0.8	620	10.3	44.7	37.9	6.3	0.8
f	2.9	0.7	620	20.3	55.5	21.3	2.7	0.2
g	2.5	0.9	619	13.3	37.6	34.3	13.3	1.6
h	2.7	0.8	622	13.3	49.7	31.7	5.1	0.2
i	2.7	0.8	624	13.3	46.8	33.0	6.3	0.6
j	2.7	0.8	621	12.9	47.8	31.9	6.9	0.5

a. To improve students' learning outcomes
b. To make the learning process more interesting
c. To strengthen students' initiative, independence and sense of responsibility in learning
d. To strengthen/develop students' analytical power/creativity
e. To strengthen/develop co-operation among students
f. To provide suitable learning activities according to individual needs
g. To provide training to prepare students for further study or future careers
h. To improve collaboration between different subjects and integrate the curriculum
i. To improve communication and co-operation among your school, parents and the community
j. To satisfy the expectations of parents and the community

From the interviews with primary school heads emerged two distinct groups with different philosophies. One group is those who are not so proactive in exploring good use of IT to improve teaching and learning outcomes. Their major concern is to comply with the requirements.

> *IT is a worldwide trend. Also the Government emphasises education as a long-term investment. It is a government policy to use IT to improve the effectiveness of teaching and learning in the classroom.*

The other group consists of those who have higher ideals about why they should explore and advance their use of IT:

> *Our IT skill sets and applications have to be close to that of Taiwan and South Korea. We have to be ahead in the world. Hong Kong is a commercial city, we have to be ahead of others in terms of our business environment and knowledge. If we do not develop information technology, we will lag behind of our competitors. ... It is essential to start IT education from schools.*

IT can help to enhance students' self-learning ability. Through IT, students can search what they need from the web and books. When teachers teach students how and where to find information, teachers and students will learn from each other and improve altogether. IT allows students to leave the classroom and broaden their learning sphere. They will learn much faster than teachers.

This group has a wider vision of integrating technology into the whole teaching and learning environment. They tend to have a good understanding of what is happening in their schools, compared to the former group, who do not really know the specifics of what is going on. The latter group tends to have a better understanding of the potential benefits to students' learning, and particularly higher-order thinking and using information, that can be achieved with the aid of IT. They proactively seek new ways to make the best use of IT in their schools whereas the former group is more concerned with problems and difficulties encountered with the ITEd initiative. The characteristics of the former group exist in spite of the fact that, as noted from the EMB Document analysis, that some specific training was provided for school heads with respect to the development of IT culture and IT plans within their schools.

6.4.2 Implementation of the school IT plan

More than 93% of the primary school heads indicated that they have adopted security measures and practices to prevent student exposure to insecure or unhealthy information in implementing their school IT plans (School Heads' Questionnaire item 17). 98.9% indicated that they encourage teachers to enroll for courses or participate in training in ITEd, although it is not clear from these data whether the training refers to IT skill training rather than training in the pedagogical use of IT. Only 76% indicated that they have defined learning targets for the implementation of the IT plan. Not many (18.4%) showed that they have used the school's IT facilities to promote a community culture of IT use, by either allowing students to use school computers appropriately for non-study purposes or allowing public access to the IT facilities in the school. In 94.9% of cases school heads said that they have used IT in school administration and management and 71.8% for researching or analysing school data, but less than half reported that they have used it for communication between teachers, students or parents, and only 49.2% indicated that they have used it for teaching (School Heads' Questionnaire item 2).

It was mentioned earlier that 97.2% of the primary schools surveyed have school websites. There is some evidence that these are used within the school since three-quarters of the P3 students and nearly all P6 students knew about them. However, as a means of communicating with the wider community and parent, the use is not so widespread. For example, as will be discussed in more detail in Section 6.4.5, only about half of the parents surveyed said they had ever browsed at their children's school webpages.

In addition, 72.1% of the respondents (School Heads' Questionnaire items 8 and 8a) said that their schools have intranet and almost all agreed or strongly agreed that the purposes for developing the intranet were to improve communication within the school, improve teaching effectiveness and to encourage students' initiative. On School Heads' Questionnaire item 8b the percentages of school heads indicating that they use the school intranet for a range of purposes were high: the highest being for storing teaching, training and learning materials (93.9%) and the lowest functioning as a communication platform for school and parents (69.4%). The school heads also gave high ratings for the usefulness/effectiveness of the school intranet for these purposes, with more than 71% giving ratings of effective/very effective for all items except functioning as a communication platform for school and parents (64%).

6.4.3 Leadership roles

The average number of IT Team members per school is 5.7 and the average teachers (including permanent and non-permanent) to IT Team members ratio is 5.4 to 1 (SD=3.7) (School Heads' Questionnaire item 14a). In most cases the responsibility for overseeing all ITEd related activities in the school falls to three main parties: the IT coordinator, the IT team and the school head (School Heads' Questionnaire item 14b). Also, 97.1% of the heads reported that their IT team participated in formulating the school IT plan (School Heads' Questionnaire item 14d). The instances of community members from outside the school participating in the formation or implementation of school IT plans are extremely low (2% or less). More than 90% of the school heads agreed or strongly agreed that their own role is to set clear objectives and guidelines, encourage and motivate teachers to make appropriate use of IT in teaching, provide sufficient training and professional development and support to teachers, to integrate IT into the school-based curriculum, to promote online learning and to allocate IT resources properly (School Heads' Questionnaire item 9a). This is consistent with the findings of the Preliminary Study. Fewer primary school heads said they see it as their role to promote online communication within the school (74.5%), although this is still a reasonable proportion), and lower again are roles beyond the immediate school community such as making the school an exemplary model (65.8%) and sharing of experiences with others outside the school community (55.7%). The IT team members' self-perceptions of their roles (IT Team Members' Questionnaire item 3) follow similar patterns to the school heads, although the percentages are slightly lower. About 90% of the IT team members expressed strong opinions about their role in encouraging and motivating teachers (90.3%) and participating in the formulation and implementation of the school's IT policy (88.9%).

6.4.4 Activities to promote IT culture

There has been a wide range of activities described in the EMB Documents that encourage schools to exchange/share ideas and experiences in the use of ITEd, particularly promoting students' use of IT in various subject areas, developing higher order thinking skills and understanding society better and becoming better citizens.

From the School IT Survey (item 4b), 609 (98.9%) of the surveyed primary schools indicated that they had done at least one of the listed activities to promote IT culture during the two years prior to data collection. Of these, 96.1% had organised IT-related extra curricular activities for students, 76.8% had organised IT courses for parents and 72.4% had organised IT competitions. Other than that, very few activities organised by the school were reported.

The School IT Survey data appear to understate the level of activities undertaken by schools to promote IT culture when compared with the School Heads' Questionnaire. When asked to show the activities in which the school had engaged in the year prior to data collection (Table 6.29, School Heads' Questionnaire item 10), nearly all of the school heads (99.5%) made a strong claim for encouraging students to make use of IT in their daily lives. Around 80% indicated that they had occasionally/always encouraged IT culture within the school community of staff and parents to some extent through providing IT courses for parents and holding experience-sharing staff meetings. Apart from these, only about one-third indicated that their schools had participated in activities to engage the community beyond the school and parents. Similarly, less than one-third had collaborated with other organisations in organising or promoting ITEd activities.

Table 6.29: Frequency of engagement in activities to promote IT culture in the past year reported by school heads (School Heads' Questionnaire, Q. 10)

Activities	% of school heads choosing the option				N
	Always	Occasionally	Rarely	Never	
Encouraged students to make use of IT in their daily lives	74.3	25.2	0.5	0.0	623
Provided IT courses to parents	14.1	61.5	17.0	7.4	623
Provided IT courses to the community	2.9	16.4	33.0	47.7	621
Made school IT facilities accessible to parents/public	5.3	28.3	28.7	37.7	621
Provided IT support to parents/the community	4.0	32.6	31.5	31.9	620
Co-operated with other schools through computer networks	2.3	26.1	37.1	34.6	622
Held public exhibitions or competitions on IT/IT in Education	2.7	19.7	26.4	51.2	621
Participated in public exhibitions or competitions on IT/IT in Education	13.6	53.1	17.1	16.3	620
Held experience sharing meetings for school staff	19.0	61.3	14.5	5.3	622
Held/participated in experience sharing meetings with other schools	8.7	52.9	23.3	15.1	618

When making comparisons to corresponding questions in the Preliminary Study it can be seen that there has been quite a dramatic increase in the percentage of school heads who indicated they had made at least some attempt to organise activities for parents and the community. More than twice the percentages of schools reported in the Preliminary study have reported providing IT courses to parents (from 45.2% to 92.6% saying that they had done this at least rarely), and increased percentages have communicated with other schools (from 12.6% to 65.4%), held public exhibitions or competitions on IT or ITEd (from 11.7% to 48.8%), and provided IT courses for the community (from 3.8% to 52.3%). An increase from 25.7% to 68.1% said they had provided some IT supports to parents and the community.

In the School Visits and interviews there were no examples cited of schools opening their facilities to the wider community – although there was a sense that it would be good to have community sharing. This is consistent with the findings of the SITES-M2 study, that there were only a few cases around the world in which the innovative uses of ICT helped to break down barriers between schools and other institutions or involved parents.

From the EMB Document analysis it was revealed that in a survey of 277 secondary and 487 primary and special schools, most schools indicated that they were willing to work with PTAs and local communities or NGOs to provide facilities for parents but not to the public due to concerns about human resources, security and maintenance. It was reported in the EMB Documents that in the 1999-2000 school year some 1000 schools had utilised the incentive grant to open up their computer facilities after normal school hours (in 2001-02 this was $14 665 for an aided school and 208 hours of overtime work at Workman II level for a government school).

6.4.5 Contributing parties to community-wide IT culture

From School Heads' Questionnaire item 11, it can be seen that a little more than 50% of the school heads had made at least some use of the EMB (52%), local schools (54.5%) or local community or commercial organisations (55.9%) to organise or co-organise ITEd activities in the past year. About another quarter had only used these organisations rarely. Only 43.4% had made use of local tertiary institutions and less than 25% had made use of schools, community or commercial organisations or tertiary institutions in Mainland China or overseas.

It appears that the surveyed primary school heads are generally of the opinion that it is the education-related institutions followed by the commercial organisations that enable the community to get in touch with IT (School Heads' Questionnaire item 12). While 82.3% of the school heads think that the EMB is making a considerable or great contribution to promoting a community-wide culture using IT, there are not so many who think considerable contributions are being made by other organisations. Around 70% think that local schools (68.1%), software or hardware service providers (68.2%), Internet service providers (72.8%) and application system developers (67.2%) are making a contribution. In other words, the highest ratings were given to those who provide the services and resources. After this, 61.2% acknowledged the contribution of tertiary institutions, but only 54.6% thought that contributions were being made by commerce and industry and less than half thought contributions were being made by professional education organisations.

With regard to the parties from whom the school sought support to plan, install or deploy IT resources (School Heads' Questionnaire item 15 and IT Team Members' Questionnaire item 1), the most common, reported to be used by more than 94% of respondents were IT team members and school administrators. 93.6% of school heads and 81.3% of IT team members reported consulting other teachers. 95.9% of the school heads and 81% of IT team members rated the input of the IT team members as being quite or very useful and 85.6% of school heads/69.1% of IT Team members rated the input of school administrators such as the vice-principal as quite or very useful. The input of other teachers was rated quite or very useful by 76.2% of school heads/59.6% of IT team members who responded to this item. 41.4% of school heads/38.6% of IT team members reported having consulted staff from EMB or the former ED and 67.5%/56.6% reported having consulted board of school directors/school management committee members. There were very few reported incidents of schools seeking input from either students (17.7% of school heads/24.5% of IT team members) or parents (28% of school heads/26.1% of IT team members) for IT planning.

The same pattern of little support seeking from the general community is supported by the interviews with Trade Association representatives. They indicated that they are willing to support ITEd through various forms of collaboration but that, as yet, they have not been invited by the Government or schools to do so. Two of the primary school heads interviewed mentioned that they had in fact organized some activities with industry through their sponsoring bodies, but that this did not happen very often. Some said that they did get support for facilities from parent-teacher associations, but again this was not the norm.

To explore further the contribution of community resources, some of the student data presented in other sections warrants some discussion here. First, it is relevant to consider the extent to which HKedCity has contributed to the IT community culture. In 2002 it was reported by the Director of Education at the Hong Kong Digital Day Carnival that more than 3.7 million people had visited HKedCity, again indicating that it has a high potential impact. As reported in relation to Research Question Set 3, 72.1% of the primary school teachers surveyed reported to have used this and 71.6% of those who had used it said they were satisfied or very satisfied with it. Students, on the other hand, did not indicate as high a use of HKedCity. Only 26.7% of P3 students and 42.7% of P6 students reported having made use of it, or even having looked at it, and 56% of those P3 students who have used it and only 35.4% of the P6 students reported it as being helpful or very helpful. It appears, therefore, that there is further room to develop the potential of HKedCity to promote an IT community culture.

The second area that can shed further light upon the community IT culture is the locations where students use computers outside their schools and homes, discussed in relation to Research Question Set 1. Less than 9% of primary students use community centres or youth centres (7% of P3 students and 8.4% of P6 students) and less than 10% use cyber cafes (3.4% of P3 students and 9.9% of P6 students). Libraries are more popular locations with P3 and P6 students (26.3% of P3 students and 26.9% of P6 students).

6.4.6 Impact on school administration and communication

More than 90% of the school heads (School Heads' Questionnaire item 9e) agreed or strongly agreed that ITEd has had an impact on school administration or management (96.6%) with respect to improved communication within (76.2%) and outside (90.2%) the school, improved management of student (94.4%) and teacher (93%) records and improved management of teaching and learning resources (95.6%).

However, when we look at parent involvement, we can see that their use of IT to communicate with the school community is quite low. Only 13.5% of P3 parents and 11.3% of P6 parents surveyed (Parents' Questionnaire item 7) said they have participated in IT or computer courses or seminars organised by their children's schools. Of the 86.5% and 88.7% who said they had not participated, 11.4% and 8.2% claimed the school had not organized IT courses and 19.5% and 15.1% said they did not know whether any courses had been offered. More than half of the non-participants gave lack of time as the reason, with relatively few saying that they are not interested. 46.6% and 54.7% of the parents said they have not browsed the homepages of their children's schools (Parents' Questionnaire item 5). Again lack of time was given as one of the major reasons for not doing so (21.2% and 31.2%), the other being lack of knowledge about the necessary IT skills (37.6% and 30.2%). 91% of P3 parents and 93.5% of P6 parents have never communicated with their children's schools through email with the aid of IT (Parents' Questionnaire item 6), with one-third stating their reasons as being lack of time, lack of the necessary technical skills and lack of need to do so (Parents' Questionnaire item 6_1).

Nevertheless, the potential exists to develop the use of IT as a means of communication. 84.7% of P3 parents and 77.1% of P6 parents who have browsed the schools' homepages believe it has enhanced their knowledge about the school (Parents' Questionnaire item 5a) and 79.3% and 69.7% of those who have used email to communicate with the school have found the outcomes to be satisfactory (Parents' Questionnaire item 6_2). Hence there is a fairly strong suggestion from these data that IT can potentially improve home-school communications for those parents who have the time and the skills to utilise it.

6.4.7 Factors affecting IT culture

School policy and planning

Nearly all of the school heads and IT team members indicated that they have taken into account a full range of factors when planning, installing and deploying IT resources: school financial situation, teaching effectiveness, environment, allocation of manpower, and students', teachers' and curriculum needs (School Heads' Questionnaire item 16 and IT Team Members' Questionnaire item 2). More than 94% of the school heads rated most of these as quite/very important, the exceptions being EMB policy (84.3%), school image (78.1%) and information security issues (85.1%), which were all rated important by about 80%. Slightly fewer IT team members rated EMB policy (72.6%), allocation of manpower (85.2%), teachers' needs (87.3%) and curriculum needs (84.6%) as important, suggesting a slight difference in the perceptions of the school heads and IT team members.

Parents' attitudes and beliefs

81.3% of P3 parents and 76% of P6 parents said they would welcome the use of IT and computers in teaching in their children's schools, with another 14.9% and 20.2% saying they would welcome it slightly (Parents' Questionnaire item 8). Comparatively speaking primary school parents seem not to be so confident that IT can improve their children's learning – they are more interested in the ways in which it can impact upon their futures. 84.3% of P3 parents and 81.1% of P6 parents said they agree or strongly agree that ITEd can help strengthen students' confidence and ability to use IT and improve future career prospects, and that the application of IT is becoming increasingly popular in daily lives (Parents' Questionnaire item 9).

6.5 Student learning

This section begins with a general overview of the extent to which students like their teachers to use computers in class. This is followed by an examination of the ways in which students use computers generally, and specifically at home or at school, and the strategies used by their teachers to encourage them to make use of IT outside school hours. The next section considers students' self-perceptions of their competence and confidence to use different aspects of IT. This is followed by a description of the outcomes of the IT Literacy Assessment (ITLA). A brief section considers the extent to which students have developed an appropriate attitude towards using IT as measured by their self-reported behaviours in various computer-related activities, and the final section explores school heads', teachers', students' and parents' perceptions of the impact of IT use on cognitive and affective aspects of the students' learning.

6.5.1 General attitudes towards teachers' use of IT for teaching

When the primary school students were asked to indicate the extent to which they liked their teachers using computers in class (Students' Questionnaire item 9), 85.6% of P3 and 75.7% of P6 students indicated they liked their teachers to use it quite or very much. In the student focus group interviews the students were unable to explain why they liked it, other than that they thought it was more fun to focus on the presentation on the screen rather than just reading the textbook. Some said that they liked the animation and sound. Some said that if the teacher uses IT they are not given any homework. Others said that they prefer a presentation with IT because, without it, the teaching is so boring. On the other hand, the reasons they gave for not liking their teachers to use IT were that it is often difficult to see the screen, it is uncomfortable sitting in the dark to watch the presentation and they sometimes feel sleepy, too much time is wasted in setting up, teachers make too much use of it, there are sometimes mistakes in the slides, it is sometimes difficult to understand and the teacher does not clarify, they cannot learn as much as directly from the teacher and they cannot use it for themselves. It is clear here that nearly all of these comments refer to students' opinions about the teacher using IT as a presentation tool. The children did not make any reference to actually using the computers themselves in class – there was only one student who mentioned in an interview that the teacher had asked the class to locate a particular website and to do the exercise provided on it.

6.5.2 Students' reported use of IT

From Table 6.30 (Students' Questionnaire item 23) it can be seen that, in general, the most common use of IT by P3 students is for self-learning and doing creative work. However, this use is not very common for P6 students, with only half or less of the students indicating that they always or occasionally use this type of application either at home or at school.

On the other hand, the P6 students reported a different pattern of use, with more focus on social activities such as email and ICQ, although again the percentage reporting this kind of use is still not particularly high (around 66% always or occasionally).

Table 6.30: Nature of IT use reported by student (Students' Questionnaire, Q. 23)

Nature of use	P3					P6				
	% of students choosing the option				N	% of students choosing the option				N
	Always	Occasionally	Rarely	Never		Always	Occasionally	Rarely	Never	
Communicating with others	13.8	14.0	12.2	60.1	2419	38.0	28.0	13.5	20.5	2470
Collaborating with others	11.9	16.4	20.3	51.4	2406	16.7	37.2	29.3	16.8	2463
Self-learning	23.8	26.5	20.7	29.0	2397	15.3	34.7	33.4	16.6	2461
Tackling practical problems in daily life	13.7	15.8	16.6	54.0	2405	13.0	24.0	30.9	32.1	2460
Doing creative work	20.7	22.9	20.9	35.5	2390	19.0	32.7	29.9	18.5	2455

When students were asked about their usage in school, the data suggest that there is very little opportunity for primary school students to use computers in class, other than in specific computer lessons. When computer lessons were excluded (Students' Questionnaire item 8), 35.6% of P3 and 47.1% of P6 students said they did not have any chance to use computers in class at all in the previous month. 24.1% of P3 and 14.9% of P6 reported that they had a chance to use it 2-3 times per week or almost daily, while around 40% of both groups reported that they used computers in class once a week or less. However, while these figures seem low, they show some slight improvement on the numbers reported in the Preliminary Study.

At school, the most common use of computers (Students' Questionnaire item 4) for both P3 and P6 is searching for information on the Internet, although there is a large difference in the percentages of P3 and P6 students who reported usual use of computers in school (33.5% and 58.5% respectively). The next highest reported use is learning computer skills (30.7% and 38.1% for P3 and P6 respectively). 32% of the P6 students said they had used computers for project work, but very few P3 students reported this use. Similarly the use of computers for presentations appears to have increased from P3 to P6 and the use of drill and practice software to have decreased. It is important to note also, here, that 21.3% of P3 students and 14.9% of P6 students said that they had not used computers at school at all in the previous month (Students' Questionnaire item 2), and 30.5% of P3 students and 14.5% of P6 students reported that they had not used computers in school for learning-related activities (Students' Questionnaire item 3).

Table 6.31: Frequency of teachers encouraging/requesting their students to use IT in different activities (Teachers' Questionnaire, Q. 10)

Activities	% of school heads choosing the option				N
	Always	Occasionally	Rarely	Never	
Reading announcements or searching for information released by the school/clubs on the school website	25.6	48.7	18.9	6.8	3653
Downloading learning materials	16.3	40.3	27.8	15.6	3643
Uploading homework/assignments	7.5	25.4	33.4	33.7	3625
Participating in online tests/examinations	9.7	33.0	31.1	26.2	3631
Checking grades and feedback on assignments from teachers	3.4	17.7	31.4	47.5	3605
Participating in forums/discussion groups	4.9	22.5	34.6	38.1	3601
Communicating with others	11.6	37.8	31.5	19.1	3631
Working collaboratively with others	15.4	40.9	25.4	18.3	3615
Self-learning	28.6	45.3	18.7	7.4	3631
Tackling problems in daily life	19.1	43.3	25.1	12.5	3629
Performing creative tasks	22.5	47.2	21.3	9.0	3639

Table 6.31 shows the teachers' reports of IT uses they have encouraged/requested their students to make in relation to teaching and learning (Teachers' Questionnaire item 10). The most commonly reported use were for reading announcements/searching for information on the school website, and for self learning, with 74.3% and 73.9% respectively saying that they had encouraged/requested their students to do these occasionally or always. The least common uses were reported as checking grades and feedback on assignments from teachers (78.9% of teachers saying they rarely or never ask their students to do this) and participating in forums/discussion groups (72.7%). Students' reports of the purposes for which their teachers encourage them to use computers outside class (Students' Questionnaire item 12) indicate that learning new knowledge is a high priority for both P3 (76.9%) and P6 (84%). Other activities are not specifically encouraged by teachers, with relatively high percentages of students saying they had not or were not sure if they had been encouraged to do them. These include homework (64% of P3 and 54.3% of P6 saying their teachers had not encouraged them or they were not sure if they had been encouraged to do this), extra-curricular activities (57.9% and 61.3%), shopping/entertainment/leisure (76.1% and 83.6%) and communicating with friends or classmates (64.4% and 57.9%). These patterns appear to be similar to those reported in the Preliminary Study. There is a big difference between P3 and P6 in teacher encouragement to use the computer outside class to make new friends (36.9% and 16.9% respectively). This may be connected to projects such as E-PAL in P3 that involve the use of email to make new friends in schools in other countries. It may also be connected to the teacher's objectives for the lesson. For example, it has been reported (Becker and Riel, 1999) that teachers who are primarily concerned for students to improve their writing and communication are more likely to assign out-of-school computer tasks than those teachers who are concerned primarily with reinforcing skills.

61.5% of the P6 respondents indicated that they had submitted their homework by floppy disk and 40.4% that they had submitted homework via email (Students' Questionnaire item 11). The figures for P3 were less than half of these. However, it is encouraging that students are using IT at least to some extent for doing homework – whether it is in computer subjects or other curriculum areas is not indicated by these data, however.

Students' Questionnaire item 24 attempted to get some insights into students' roles in the use of IT. For the P3 students it was found that 51.8% had occasionally or always engaged in self-learning of new computer skills/knowledge but on the other items the majority said they had rarely or never engaged in the activities: recommending useful websites/software/hardware to classmates/friends (66.3%), teaching others (57.6%) or helping others (55.4%). For the P6 students the percentages reporting occasionally/always engaging were higher: self-learning of new computer skills/knowledge (72.5%), helping others (62.6%), teaching others (57%) and recommending useful websites/software/hardware to classmates/friends (54.5%).

6.5.3 Students' pedagogical use of IT

Table 6.32 shows the average time spent by students per week on various activities as reported in the IT Activity Daily Log.

Table 6.32: Average time spent per week on various activities (ITADL)

Activity type	P.3 (N = 68)				P.6 (N = 85)			
	Time spent (min)	Importance (1–5)	Performance (1–5)	Liking (1–5)	Time spent (min)	Importance (1–5)	Performance (1–5)	Liking (1–5)
Classroom activity	25.9	3.8	3.2	4.1	35.8	3.1	3.3	3.1
School works activity	29.7	3.4	3.4	3.6	23.3	4.3	4.0	4.0
Self-learning/studying	32.8	3.3	3.7	4.5	30.7	3.4	3.6	3.6
Communication	6.5	2.6	3.5	3.4	35.9	3.2	4.1	4.2
Browsing Internet	13.3	3.3	4.2	4.2	36.3	3.0	4.1	4.1
Listening Music	10.9	2.9	2.7	3.2	36.3	2.8	4.0	4.3
Watching Movie	8.1	2.1	2.8	3.6	16.0	3.0	4.5	4.2
Entertainment games	77.1	1.8	4.1	4.4	109.5	2.3	4.0	4.4
Learning-related games	38.3	2.0	3.9	4.0	28.0	3.3	3.8	4.0

An examination of the data from the primary school students' IT Activity Daily Log indicates that the activity on which students spent the most time during the week of recording activities was entertainment games. However, when we look at the total amount of time spent on learning related activities, including classroom activity (from 25.9 minutes per week for P3 to 35.8 minutes in P6), school work (29.7 minutes per week for P3 and 23.3 minutes to P6), self-learning (32.8 minutes per week for P3 and 30.7 minutes for P6) and learning-related games (38.3 minutes per week for P3 and 28 minutes for P6), we can see that the P3 students actually spent more time on this type of activity than on entertainment-related activities like playing entertainment games (from 77.1 minutes per week for P3 to 109.5 minutes in P6), watching movies (from 8.1 minutes per week for P3 to 16 minutes in P6) and listening to music (from 10.9 minutes per week for P3 to 36.3 minutes in P6). On the other hand, the P6 students, on average, spent about 50 minutes more per week on entertainment activities than on learning-related tasks. The P6 students also reported that they spent a lot more time on communication-related activities and browsing the Internet than did the P3 students.

When considering the actual tools the students reported using, a clear pattern emerges of PC games (89.1 minutes per week for P3 and 105.7 for P6) and web browser (78.2 minutes per week for P3 and 97.6 for P6). There is also a dramatic increase in reported time spent on ICQ, from 18 minutes in P3 to 55.5 minutes in P6, and use of audio/video software (from 16.5 minutes in P3 to 41.6 minutes in P6). P6 students also reported spending about 12 minutes more per week on email than P3 students. Word processing, spreadsheets or presentation software were not used very much by either group. Apart from Computer Studies, the highest usage by subject area for both groups was for Chinese Language

(23.2 minutes for P3 and 12.6 minutes for P6). This is a similar pattern to that reported in the Preliminary Study. For General Studies the P3 students spent 16 minutes and the P6 students spent 18.6 minutes. The P3 students also recorded fairly high usage in English (25.3 minutes for P3 and 9.1 minutes for P6), and Mathematics (12.2 minutes for P3 and 6 minutes for P6), which the P6 students did not. It is somewhat surprising that the use of computers in Art and Craft was not particularly high.

It is interesting to note that the students completing the IT Activity Daily Log rated school-related activities as the most important (with means of between 3.1 and 4.3 on a scale of 1-5 for P3 and P6 respectively) but when it came to rating their activities for their performance levels and liking, the higher mean ratings, close to or above 4, were given to Internet use, games (both entertainment and educational), and, for P6 students, movies and music and communication.

6.5.4 Students' self-ratings of IT competence

The first area in which students were asked to self-rate was their personal confidence with using IT (Students' Questionnaire item 30). The results are shown in Table 6.33. Most students indicated that they felt at least reasonably confident in using computers for their own purposes. Only 17.9% of P3 and 8.5% of P6 students said they felt not quite confident or not confident at all. This adds further support to the observation that computer use has become a part of life even for primary school students. As would be expected, more P6 than P3 students rated themselves as quite or very confident – however, since the tasks that P6 students do are of a different nature and more demanding, the two cannot be compared directly.

Table 6.33: Students' self-rating of confidence with using IT (Students' Questionnaire, Q. 30)

Confident level	P3 (N = 2387)	P6 (N = 2450)
	%	%
Very confident	38.0	27.9
Quite confident	17.2	35.6
Average	26.9	28.0
Not quite confident	9.4	6.2
Not confident at all	8.5	2.3
Total	100	100

When asked about their self-rating of proficiency in hardware use (Students' Questionnaire item 21), there were no significant patterns other than a trend for an increased self-perception of proficiency from P3 to P6, as shown in Table 6.34 below.

Table 6.34: Students' self-rating of proficiency in using/operating hardware (Students' Questionnaire, Q. 21)

	Perceived proficiency	Mean (0-4)	SE	N	% of students choosing the option				
					Highly proficient	Basically proficient	Know some	Not proficient	Know nothing at all
P3	Printer	2.0	0.05	2414	28.2	15.3	15.2	9.4	31.9
	CD-R/CD-RW	2.0	0.05	2398	27.5	16.3	13.1	10.9	32.2
	Digital Camera	1.6	0.05	2391	21.2	13.0	14.5	12.1	39.2
	Digital Video Recorder	1.4	0.04	2390	17.2	10.9	12.6	13.8	45.5
	Scanner	1.4	0.04	2390	15.6	12.1	13.0	14.2	45.2
P6	Printer	3.0	0.04	2468	48.7	23.2	13.5	6.8	7.8
	CD-R/CD-RW	2.6	0.04	2465	37.6	21.9	16.9	11.6	12.0
	Digital Camera	2.2	0.04	2467	27.3	19.3	18.1	16.5	18.9
	Digital Video Recorder	1.9	0.04	2464	18.2	17.4	20.3	20.6	23.6
	Scanner	2.2	0.04	2458	25.7	19.1	19.9	16.2	19.1

In Table 6.35, there is evidence of a general trend for increased self-rating of proficiency in software use from P3 to P6 (Students' Questionnaire item 20). Comparing Student Questionnaire item 20 on this

Study to Student Questionnaire item 8 of the Preliminary Study, we can see that the mean ratings are almost identical. The only slight difference is on designing computer graphics/drawing, where the mean for this Study is 2.1 of P3 and 2.3 of P6 (on a scale from 0 to 4) while that of the Preliminary Study was 2.9 (on a scale from 1 to 5) which, when these means are converted to a common denominator, suggests that the students in the Preliminary Study perceived themselves to be slightly less proficient than the students in this Study.

Searching and using information from the Internet had the highest proportions of both P3 and P6 students rating themselves as basically or highly proficient, but there is quite a big increase from 50.8% of P3 to 81.8% of P6. The areas in which the students rated their proficiency lowest were designing web pages and using multimedia software. This relates to the finding presented earlier that students' consider themselves to be proficient at general computer usage but less so in using more specialised tools. Proficiency with word-processing was rated lower than might have been expected (42.4% P3 and 54.4% P6 rating themselves as basically/highly proficient). However, this might have been linked to lack of keyboarding skills or formatting skills. Furthermore, the relatively large standard deviations of the items suggest that there are wide variations across students in terms of their software skills.

Table 6.35: Students' self-rating of proficiency in software use (Students' Questionnaire, Q. 20)

	Perceived proficiency	Mean (0-4)	SE	N	% of students choosing the option				
					Highly proficient	Basically proficient	Know some	Not proficient	Know nothing at all
P3	Using word processing software	1.9	0.05	2421	20.0	22.4	18.2	9.1	30.3
	Using spreadsheets	2.1	0.04	2413	24.7	22.7	18.2	8.8	25.7
	Using presentation software	1.8	0.04	2395	16.8	19.6	18.2	12.9	32.6
	Using online communication tools	1.8	0.04	2393	20.4	17.7	16.1	11.6	34.2
	Searching and using information on the Internet	2.3	0.04	2399	31.3	19.5	17.5	8.5	23.2
	Designing web pages/sites	1.5	0.04	2403	17.3	15.0	13.3	12.9	41.6
	Designing computer graphics/ drawing	2.1	0.04	2383	26.6	18.7	16.5	10.6	27.7
	Using multi-media software	1.6	0.04	2380	17.2	14.5	16.0	12.4	39.9
P6	Using word processing software	2.5	0.04	2464	20.9	33.5	27.5	8.8	9.3
	Using spreadsheets	2.6	0.04	2460	24.0	32.9	26.6	8.6	8.0
	Using presentation software	2.8	0.04	2459	34.3	30.6	20.5	8.2	6.4
	Using online communication tools	2.9	0.03	2452	44.1	25.1	17.7	7.0	6.1
	Searching and using information on the Internet	3.2	0.03	2451	52.6	29.2	12.0	3.1	3.2
	Designing web pages/sites	2.0	0.04	2457	14.1	23.1	28.3	15.8	18.8
	Designing computer graphics/drawing	2.3	0.04	2449	19.8	27.4	28.3	13.2	11.3
	Using multi-media software	2.0	0.04	2444	14.7	23.5	26.0	16.5	19.3

6.5.5 IT literacy assessment outcomes

ITLA Section 1 (Computer knowledge and skills)

As explained in Chapter 4, in order to examine the extent to which the students had met the criterion-based expectations of IT targets on the ITLA Section 1, three categories of indicator were used: those who were able to answer less than 50% of the items correctly, those who were able to answer from 50% to 80% of the items correctly and those who were able to answer more than 80% correctly. Students who scored above 80% were considered to have complete mastery of the stage-specific knowledge and skills, since a 20% tolerance level was set up to allow for random variation which may affect the test score from a variety of sources, such as distractions in the assessment environment, the occasion of testing, the rater, the examinee's state of mind at the time of testing, etc. It is not intended to be a cut-off point implying pass/fail or competence/incompetence since students' competence should be conceived of as a continuum of skills rather than a dichotomy, and any chosen tolerance level is arbitrary. Those who scored from 50% to 80% were considered to have at least a reasonable grasp.

In Section 1 of the ITLA (Table 6.36) only 10.3% of P3 students and 27.2% of P6 had more than 80% of their answers correct, with 73% of P3 students and 58.5% of P6 students falling into the 50%-80% category. 16.7% of P3 and 14.3% of P6 students scored lower than 50%. The high percentages scoring 50% correct or more, coupled with the findings reported earlier (Section 6.5.4) concerning students' self-rated proficiency in hardware and software skills, suggest that the majority of students have at least a reasonable grasp of stage-specific technological knowledge and skills.

Table 6.36: Distribution of students' ITLA Section 1 scores

% of correct	**P3 (N = 608)**	**P6 (N = 623)**
	%	**%**
< 50%	16.7	14.3
50 – 80%	73.0	58.5
> 80%	10.3	27.2
Total	100	100

ITLA Section 2 (Self-perceived ability in generic IT skills)

The distribution of students' ratings on their self-perceived ability in generic IT skills is shown in Table 6.37. At P3 level of Section 2 of the ITLA, the majority of students indicated they were basically proficient or highly proficient at tasks such as switching the computer on and shutting down correctly (91.7%), editing an image (70.5%), inputting Chinese texts (63.8%), using software for self learning (61.5%). More than half said they could use computers to do homework/write reports (51.9%), search for information from the Internet (54.2%) and use the Internet securely (53.4%). These activities probably correspond to what is required of students at this stage. The items on which they performed the lowest were web page design and multimedia use, which is consistent with earlier findings that they have not made very much use of this type of application.

47.9% of the P3 students rated themselves as basically or highly proficient at using IT to solve problems related to learning and 36.3% thought they were not proficient or knew nothing at all about this. 32.9% said they were basically or highly proficient at using IT to solve problems related to daily life, and 51.7% admitted they were not proficient at this or knew nothing about it. However, it must be noted that some of the skills included in this item might not have been expected of these students at this stage.

Most of the P6 students perceived themselves to be basically or highly proficient at most of the tasks, particularly in switching the computer on and shutting down correctly (97.6%), searching information from the Internet (84.3%), delivering documents/information to others electronically (79.7%), inputting Chinese texts (79.6%), using software for self learning (77.5%) and using Internet securely (81%). The P6 students rated themselves more highly than the P3 students did on using IT to solve problems related to learning and to daily living. 66.5% rated themselves as basically or highly proficient and only 12.6% as not proficient or knowing nothing about using IT to solve problems related to learning. 49.1% rated themselves as basically or highly proficient at using IT to solve problems related to daily life, but only 26.2% claimed themselves to be not proficient at or knowing nothing about this.

Table 6.37: Distribution of students' scores in ITLA Section 2 (ITLA, Section 2, Q. 1 – 20)

Self-perceived proficiency		Mean (0-4)	SE	N	% of students choosing the option				
					Highly proficient	Basically proficient	Know some	Not proficient	Know nothing at all
P3	Switch the computer on and shutdown correctly	3.7	0.05	606	81.6	10.1	4.8	0.5	3.0
	Use computer software for self learning	2.6	0.07	604	33.7	27.8	19.8	5.4	13.2
	Use an electronic/Internet dictionary/ encyclopedia	2.2	0.06	596	26.9	22.2	19.7	8.1	23.1
	Input Chinese texts	2.7	0.06	598	39.4	24.4	17.7	8.0	10.5
	Do homework/write reports	2.3	0.07	604	31.2	20.7	16.5	9.3	22.2
	Create statistical diagrams	2.0	0.07	597	23.1	20.7	17.3	11.1	27.8
	Create presentation materials	1.9	0.07	600	21.9	19.6	14.5	12.4	31.5
	Search for information from the Internet	2.4	0.07	598	34.1	20.1	16.9	9.0	19.9
	Create a webpage/set up a website	1.7	0.07	601	19.1	18.2	15.2	10.8	36.7
	Produce a multimedia clip/animation	1.8	0.07	598	21.5	15.3	16.4	11.6	35.2
	Edit an image or typeset	2.9	0.05	593	48.6	21.9	13.7	7.3	8.5
	Create/use a database	1.7	0.07	605	18.1	18.2	16.3	11.7	35.6
	Share/discuss in a news group/discussion forum	1.7	0.07	602	17.6	17.6	16.1	10.9	37.8
	Download information/software from the Internet	2.0	0.07	603	24.5	17.4	16.3	12.5	29.2
	Distinguish the credibility of Internet information/news	1.8	0.07	597	22.8	15.3	17.1	12.7	32.1
	Use Internet securely	2.3	0.08	600	32.4	21.0	14.1	12.2	20.4
	Protect the computer from a virus/hacker attack	1.9	0.07	597	24.3	17.5	15.9	9.9	32.5
	Deliver documents/information to others	1.9	0.08	603	24.1	17.1	13.8	10.9	34.1
	Solve problems related to learning	2.2	0.07	606	27.7	20.2	15.8	13.6	22.7
	Solve problems related to daily life	1.6	0.08	605	19.5	13.4	15.4	13.2	38.5
P6	Switch the computer on and shutdown correctly	3.9	0.02	623	91.4	6.2	2.2	0.1	0.1
	Use computer software for self learning	3.1	0.04	619	39.7	37.8	17.8	2.8	1.9
	Use an electronic/Internet dictionary/ encyclopedia	3.0	0.04	616	37.7	30.9	23.5	4.8	3.1
	Input Chinese texts	3.2	0.04	615	52.7	26.9	15.0	3.5	2.0
	Do homework/write reports	3.0	0.04	621	39.8	33.1	20.0	4.6	2.6
	Create statistical diagrams	2.8	0.05	617	30.2	36.6	22.9	8.3	2.1
	Create presentation materials	3.0	0.05	617	42.1	29.9	19.2	5.2	3.6
	Search for information from the Internet	3.4	0.05	613	65.3	19.0	10.1	3.2	2.4
	Create a webpage/set up a website	2.1	0.06	621	18.0	25.6	24.6	14.8	17.0
	Produce a multimedia clip/animation	2.1	0.05	620	15.1	27.6	25.3	16.9	15.1
	Edit an image or typeset	3.1	0.05	615	47.6	26.9	15.9	6.5	3.1
	Create/use a database	2.0	0.05	622	14.1	25.1	27.3	17.2	16.3
	Share/discuss in a news group/discussion forum	2.2	0.06	616	19.8	25.4	20.3	20.0	14.5
	Download information/software from the Internet	3.0	0.05	618	43.4	27.4	17.2	7.5	4.6
	Distinguish the credibility of Internet information/news	2.7	0.05	615	27.1	32.8	25.6	7.8	6.8
	Use Internet securely	3.2	0.04	619	52.4	28.6	12.0	4.7	2.4
	Protect the computer from a virus/hacker attack	2.7	0.05	615	33.3	26.7	21.4	11.0	7.6
	Deliver documents/information to others	3.2	0.05	623	57.2	22.5	9.1	5.5	5.7
	Solve problems related to learning	2.8	0.05	621	33.8	32.7	21.0	8.8	3.8
	Solve problems related to daily life	2.3	0.06	623	22.8	26.3	24.7	12.3	13.9

In relation to students' skills, it is clear from the qualitative analyses described elsewhere in this chapter that primary schools are not actively teaching information literacy as opposed to IT skills and knowledge.

6.5.6 Students' attitudes towards IT

Item 28 in the Students' Questionnaire (Table 6.38) was written in behavioural terms to reflect the appropriateness of students' attitudes towards IT. 77.9% of P6 and 64% of P3 students reported that they usually or always spend long periods of time playing computer/online games during holidays. This is consistent with findings reported earlier about the popularity of games, and was also reported in a survey conducted in Hong Kong by Choice Magazine (2003). It was also a concern expressed in the interviews with school heads and teachers, with some cases cited of students spending days and nights on the Internet and games, and sometimes skipping school to do it. This kind of behaviour was also corroborated by the Choice Magazine survey. Otherwise, however, the responses demonstrate that there is some level of awareness and, generally, more than 80% reported that they do not engage in inappropriate practices. It is interesting to note that use of IT to share views, feelings or interests with others was only rated occasionally or always by about 30% of students in both grades, which is perhaps not as high as hoped since an aim of ITEd is to promote this kind of sharing.

Table 6.38: Students' self-reported behaviours in using IT (Students' Questionnaire, Q. 28)

Activities	P3					P6				
	% of students choosing the option				N	% of students choosing the option				N
	Always	Occasionally	Rarely	Never		Always	Occasionally	Rarely	Never	
a.	32.5	31.5	17.7	18.3	2424	40.3	37.6	15.2	7.0	2468
b.	14.4	22.8	22.2	40.7	2411	14.0	31.0	33.4	21.6	2463
c.	6.8	8.7	8.5	76.0	2398	1.0	1.1	3.2	94.8	2463
d.	12.1	14.5	17.6	55.8	2395	9.0	16.3	25.4	49.3	2438
e.	6.7	9.7	8.3	75.3	2411	2.3	4.9	12.2	80.6	2460
f.	5.1	7.1	7.1	80.8	2413	1.6	3.6	3.4	91.3	2462
g.	16.5	14.6	20.3	48.6	2406	11.4	17.9	30.6	40.1	2456
h.	4.7	7.0	8.8	79.6	2381	5.8	7.5	16.7	70.4	2455

a. Spending long period of time on playing computer/online games during holidays
b. Paying attention to new IT products and services
c. Browsing websites containing pornographic materials
d. Sending/forwarding E-mail/messages to friends even though you are not sure of the accuracy of the E-mail/messages
e. Disclosing personal particulars to strangers online
f. Playing jokes on friends by sending E-mail bombs or computer virus
g. Using IT to share your views/feelings/interests with others
h. Using pirated (illegal) software

6.5.7 Perceived impacts of IT on students

As can be seen in Table 6.39 below (School Heads' Questionnaire item 9c), the primary school heads expressed a strong belief that ITEd has had an impact on students' increased subject knowledge, improved computer skills and learning effectiveness, as well as affective factors including stimulated interest and increased initiative to learn. To a lesser extent but also quite strongly, the principals perceived that ITEd has had impacts on enhanced creativity, confidence and strengthened co-operation with others. The majority of heads did not report any perceived negative impacts. The school heads' mean ratings for corresponding items on the Preliminary Study were very similar to these.

Table 6.39: Heads' perceptions of impacts of ITEd on students (School Heads' Questionnaire, Q. 9c)

Impacts	Mean (0-4)	SD	N	% of school heads choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
Increased subject knowledge	3.2	0.5	619	28.0	66.4	5.3	0.3	0.0
Improved computer skills	3.4	0.6	621	46.2	51.5	2.1	0.0	0.2
Enhanced creativity	2.9	0.7	621	16.6	61.5	20.5	1.5	0.0
Improved communication and expression skills	2.6	0.8	621	10.6	45.4	38.3	5.2	0.5
Strengthened co-operation with others	2.6	0.7	621	6.8	54.1	34.1	4.7	0.3
Weakened interpersonal skills due to excessive time spent on computers	1.9	0.8	620	2.3	20.5	43.1	31.9	2.3
Negligence of school work due to excessive time spent on computers	1.5	0.8	620	1.5	9.0	36.3	46.6	6.6
Stimulated interest in learning	3.2	0.5	621	19.3	77.0	3.4	0.3	0.0
Increased initiative to learn	3.0	0.6	621	13.7	71.3	13.7	1.3	0.0
Increased confidence	2.8	0.6	621	8.5	65.7	24.6	1.1	0.0
Improved learning effectiveness	3.0	0.5	621	14.0	73.0	12.7	0.3	0.0
Widened perspective through enlarged social circle	2.4	0.7	621	3.4	44.8	42.8	8.1	1.0
More opportunity for being exposed to unhealthy information	2.3	0.9	621	4.5	42.2	32.2	19.8	1.3
Developed high-level thinking	2.5	0.7	620	5.3	47.9	42.4	3.9	0.5

Similarly, as can be seen from Table 6.40 (Teachers' Questionnaire item 14e), the primary school teachers also indicated their perception that IT has impacted on students' increased subject knowledge and learning effectiveness as well as interest and initiative to learn and, to a lesser extent, concentration. On the other hand, only 34.5% of the teachers feel strongly that IT use has contributed to any clear progress in academic performance. This was further supported by one of the teacher focus group interviews, in which some teachers expressed the concern that the use of IT cannot help students develop analytic skills because they often do little more than cut and paste information from the Internet without analyzing or synthesizing. The following quotations from teacher focus group interviews illustrate this concern:

> *... we have animation for everything that can be displayed to the students. Gradually, you will find that their imagination is diminishing, because they can see everything from the animations and do not need to think any more. Why is the bear white if it is brown on the screen? It is limiting children's creative thinking. This may be one negative impact of IT. They have everything given to them, why do they need to think?*
>
> *That really depends on the how teachers facilitate them. Say for example, Integrated Science, if you ask them to work on a topic, the simplest thing to do is go to the internet, copy and paste. Those who are more serious may give you 2 more pictures, or delete a few words and work out their own summaries. Use of IT in teaching may lead to very impressive result, or just a piece of ordinary homework. That depends how teachers lead them.*

Generally the primary school teachers interviewed did not think that there is any direct relationship between IT use and student attitudes to learning. They see attitudes as being a separate issue from IT, depending on a lot of factors of which IT use is only one.

Table 6.40: Teachers' perceptions of benefits to students of IT use in their most satisfying lessons with IT (Teachers' Questionnaire, Q. 14e)

Benefits	Mean (0-4)	SE	N	% of teachers choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
Increased subject knowledge	3.2	0.01	3620	24.0	69.8	5.7	0.4	0.1
Improved computer skills	2.4	0.02	3582	8.0	42.6	32.8	13.0	3.6
Improved information processing ability	2.4	0.02	3576	7.0	47.5	30.9	11.8	2.8
Enhanced creativity	2.5	0.02	3572	8.6	46.8	32.3	10.0	2.4
Improved communication and expression skills	2.5	0.02	3581	8.1	49.0	32.4	9.0	1.5
Learned to co-operate with others	2.5	0.02	3579	9.1	48.1	29.8	10.8	2.2
Stimulated interest in learning	3.2	0.01	3627	26.4	66.7	6.0	0.7	0.3
Increased initiative to learn	3.0	0.01	3609	20.1	60.6	16.9	2.0	0.4
Increased confidence	2.7	0.02	3587	12.0	52.4	30.4	4.3	0.9
Improved learning effectiveness	3.0	0.01	3607	17.7	64.6	15.6	1.7	0.4
Enlarged social circle	2.1	0.02	3568	4.6	30.0	44.5	16.4	4.5
Widened perspective through more interaction with the outside world	2.6	0.01	3575	11.5	52.7	26.3	7.4	2.2
Greater concentration in learning	2.7	0.02	3597	10.7	55.0	29.2	4.4	0.8
Easier and deeper understanding of the lesson	2.9	0.01	3604	14.7	64.5	18.5	2.1	0.3
Clear progress in academic performance	2.3	0.01	3560	4.6	29.9	56.8	7.6	1.2

The heads' and teachers' perception of increased interest is further supported by the students' views of what they have gained from IT use in class depicted in Table 6.41 (Students' Questionnaire item 13b). In all cases, increased subject knowledge and stimulated interest in learning are the two most highly rated gains from the lesson. This appears, however, to be contradicted somewhat by the perception of the majority of the students interviewed, that IT is more of a 'toy' than something that has an impact on their attitudes to learning. Their overall view was that it helps them to access information more easily and it is a good thing to use, but they had no real thinking about why and how it helps them, other than that some did have the perception that if they develop their IT skills they will have better future job prospects. But mostly they saw it as just one tool rather than a major contributing factor. In fact, some said that their parents ban computer use during the exam period, which further seems to suggest that students and their parents regard the computer as a potential distraction rather than as something that can enhance their learning. The claim indicated by the quantitative data in Table 6.40 is further contradicted by the school heads and teachers interviewed who said they have perceived no impact of IT on students and even further counter evidence comes from the classroom observation data. While the quantitative data are suggesting that principals and teachers see one purpose of IT being to motivate students and create greater interest in learning, classroom observations indicated that this has nothing to do with IT per se but rather to do with the interaction between IT and the teacher's instructional design. It was observed consistently that students' interest and motivation were high only when there was some kind of interaction built in with the help of IT. In the didactic, teacher-centred types of presentation using PowerPoint the observers did not see any signs of particular interest, whereas the students were more motivated on the occasions when they were given a chance to use IT as a tool for learning rather than when it was being used as a tool for teaching with technology.

In summary, it is suggested here that while the quantitative data suggest that IT has positive impacts on students, the qualitative data implies that it may not be as simplistic as the statistics suggest. Moreover, the perceived impact on information processing ability and communication and expression skills is not particularly high considering that these are important aspects of a student-centred approach to teaching and learning.

Table 6.41: Students' perceptions of what they have gained from their lessons they like the most with IT application (Students' Questionnaire, Q. 13b)

	Perceived gain	Mean (0-4)	SE	N	% of students choosing the option				
					Strongly Agree	Agree	Neutral/ Uncertain	Disagree	Strongly Disagree
P3	Increased subject knowledge	3.3	0.02	2425	56.4	28.3	11.2	1.8	2.3
	Improved computer skills	3.2	0.02	2422	50.8	28.0	15.3	3.2	2.8
	Improved information processing ability	2.9	0.02	2408	37.1	28.6	25.7	5.2	3.3
	Enhanced creativity	3.0	0.03	2401	43.2	27.0	20.3	6.2	3.3
	Improved communication and expression skills	2.6	0.03	2395	31.3	25.0	27.4	10.0	6.3
	Learned to co-operate with others	3.0	0.03	2409	45.1	24.6	18.9	5.9	5.4
	Stimulated interest in learning	3.4	0.02	2401	60.2	25.9	8.9	2.6	2.4
	Increased initiative to learn	3.1	0.02	2396	44.5	27.9	19.9	3.9	3.8
	Increased confidence	2.8	0.03	2395	36.5	27.4	23.3	7.1	5.7
	Improved learning effectiveness	2.9	0.03	2392	39.3	28.9	22.9	4.6	4.3
	Enlarged social circle	2.6	0.03	2380	29.4	22.6	31.3	8.4	8.3
	Widened perspective through more interaction with the outside world	2.6	0.03	2384	31.8	22.7	28.8	7.3	9.4
P6	Increased subject knowledge	3.1	0.02	2473	36.2	46.0	14.7	1.5	1.7
	Improved computer skills	3.0	0.03	2467	35.7	36.5	20.2	4.6	3.0
	Improved information processing ability	2.8	0.03	2459	27.1	37.0	27.8	5.6	2.5
	Enhanced creativity	2.6	0.03	2458	21.8	31.5	33.8	10.1	2.8
	Improved communication and expression skills	2.4	0.03	2463	17.9	25.9	39.0	12.8	4.4
	Learned to co-operate with others	2.7	0.03	2460	27.2	35.3	25.9	8.1	3.6
	Stimulated interest in learning	3.1	0.02	2459	41.0	38.0	15.5	3.6	1.8
	Increased initiative to learn	2.7	0.03	2465	26.1	30.9	31.7	7.4	3.8
	Increased confidence	2.4	0.03	2463	18.4	24.4	38.5	12.6	6.2
	Improved learning effectiveness	2.8	0.03	2458	26.6	38.0	27.7	5.0	2.8
	Enlarged social circle	2.4	0.03	2460	18.9	24.3	37.7	13.1	6.0
	Widened perspective through more interaction with the outside world	2.7	0.03	2456	28.7	30.1	28.4	7.8	5.1

The above patterns are supported further by the students' perceptions of the impact of their teachers using IT as opposed to using it themselves in class (Students' Questionnaire item 10). 79.1% of P3 students and 74% of P6 students agreed or strongly agreed that classes have become more interesting as a result of their teachers using IT. Fairly high proportions of students also agreed or strongly agreed that the teachers' use of IT has made it easier for them to understand subject content and to tackle some of their learning problems. Generally higher proportions of P3 students agreed that the teachers' use of IT has had an impact, with one of the biggest differences between P3 and P6 being in their perception that their academic performance had improved. However it must be noted again, as discussed above, that there seems to be some contradiction between the quantitative data here and the suggestion from interviews with school heads, teachers and students and classroom visits that there has not been very much impact and that, where it has occurred, it has been a consequence of the way in which the teacher has used the IT rather than of the IT itself.

Parents were less sure about the impacts of home computers on their children's academic results, with the majority of parents of both P3 and P6 children saying there was no impact (Parents' Questionnaire item 4a). It may be interesting to note that more parents of P6 children indicated the belief that home computers had negative impacts on their children's academic achievement, however these percentages are quite low (21.9% of P6 compared to 10.7% of P3). Generally the teachers and students in this Study had a more positive view than those in the Preliminary study of the impact of ITEd on students, but only by half a point or less for most items.

6.5.8 Impediments to use of IT as perceived by the students

Less than 34% of the primary school students expressed concern about any of the listed potential obstacles to using IT (Students' Questionnaire item 26). Slightly more P6 students were concerned about insufficient computer facilities at home or parents' failure to recognise the importance of IT or misunderstanding of the reasons for using computers, while the P3 students seemed to be more concerned about having no access to the Internet at home. In the interviews, however, the students did not seem to be too concerned about lack of home computers because if they need to use one outside of school hours they can usually find a place to do so. The most interesting finding was that 33.3% of P6 students felt that insufficient time allowed to students for using computer facilities at school was an obstacle, with fewer P3 students (24.1%) being concerned by the same thing.

Chapter 7 General Findings from Secondary School Sector

This chapter reports the general findings for the Secondary School Sector, following the same framework for analysis as in Chapter 6 for the Primary School Sector. It draws upon the descriptive data from the range of questionnaire surveys and the observations collected from the qualitative instruments that address the following aspects of the ITEd initiatives for this sector:

§ Access, connectivity and usage
§ Teacher enablement
§ Curriculum, pedagogy and resource support
§ School and wider community culture, and
§ Student learning.

7.1 Access, connectivity and usage

This section examines the extent and nature of access to and usage of IT in the surveyed secondary schools and the staff members' and students' homes. It begins with a breakdown of the numbers and locations in schools of hardware and the extent and nature of connectivity in schools. Next, it reports the expenditure patterns of school-based IT budgets. This is followed by looking into access and connectivity at home and finally examining general usage patterns of secondary school heads, teachers and students.

7.1.1 Access to school IT facilities

Quantity and locations of hardware

Table 7.1 gives an overview of the mean numbers of different types of hardware in secondary schools, obtained from School IT Survey Item 2a. These numbers are fairly impressive and the total number of computers well exceeds the minimum target of 82 specified in the *Five-Year Strategy*. The averages of 164.7 desktop computers and 72.3 notebook computers per school are higher than the averages of 135.6 (desktop) and 33.5 (notebooks) reported in the Preliminary Study for secondary schools, showing considerable increases during the interim period since then. These figures indicate that secondary schools are extremely well provided for, and show a marked improvement since the Preliminary Study.

Table 7.1: Quantity of hardware (School IT Survey, Q. 2a)

Item	Mean	SD
Desktop computers	164.7	56.4
Notebook computers	72.3	35.4
Server machines	7.4	3.5
Application servers	7.7	3.9
Application server that do not run on MS Windows/NT platform	0.8	0.4
Wireless LAN	1.9	4.5
Video Capture Encoding System	2.8	5.0
Video Conferencing System	0.4	0.8
Digital camera	4.0	3.8
Voice input/recognition system	0.8	4.6
Video broadcasting system	0.4	0.6
Digital Camcorder	2.9	2.2
Electronic musical instrument	1.8	5.1
Visualisers	3.6	5.1
Color Laser Printers	1.5	1.6
Bar code scanner	2.0	1.4
CD-RW	14.4	14.1
DVD-writers	0.6	1.1
LCD Monitors	11.0	17.0
Smart card reader	0.7	1.8

Note: N = 378

These data show that the schools have acquired a range of equipment including digital cameras, CD-RWs, digital cam-corders, visualisers, LCD projectors and servers. The numbers of these items are far more than those recorded in primary schools (see Chapter 6). 88.4% of the schools reported having more than 160 computers, and only 1.3% reported having 81 or less. LCD monitors and visualisers were the most frequently reported peripherals, although there were not many of either reported. The distribution of schools with respect to the total number of computers is shown in Table 7.2.

Table 7.2: Distribution of schools with respect to total number of computers

Total number of computers in school	Number of schools	%
≥ 321	36	9.5
241-320	133	35.2
161-240	165	43.7
82-160	39	10.3
≤81	5	1.3
Total	378	100

The average ratio of students to computers available for student use is 8 to 1 (SD = 4.7). When taking into account all of the computers in schools, including in general offices, staff rooms, libraries etc., the ratio is 4.6 students per computer. This shows a progressive improvement in the ratio from the average of 36 students per computer for Hong Kong reported in the SITES-M1 study and 7.5 reported in the Preliminary Study for secondary schools. It can be seen from Table 7.3 (only taking into account the computers that are accessible to students) that the majority of schools have student to computer ratios that fall within the range of 4 to less than 12 students per computer (84%). 9.3% of the schools with better than four to one ratio and 1.1% have 20 or more students per computer.

Table 7.3: Distribution of schools with respect to student-computer ratio

Student-computer ratio	Number of schools	%
≥ 20	4	1.1
16 – <20	3	0.8
12 – <16	18	4.8
8 – <12	135	35.6
4 – <8	183	48.4
< 4	35	9.3
Total	378	100

Table 7.4: Locations of computing/network facilities installed (School IT Survey, Q. 2b)

Locations	**N**	**Computers**		**LCD Projectors**		**Network ports**		**Wireless, hub or switch connection**	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
General classrooms	378	10.5	12.2	15.5	11.3	25.2	11.7	0.0	0.0
Computer rooms	376	42.0	22.1	1.7	0.8	45.0	24.2	0.0	0.0
MMLC	348	45.2	10.3	1.0	0.3	44.6	14.8	0.0	0.0
ITLC	109	38.4	11.0	1.1	0.6	38.4	16.7	0.0	0.0
Library	377	10.5	7.1	0.3	0.8	12.2	7.9	0.0	0.0
Special rooms for educational purposes	355	16.6	19.1	6.9	3.7	17.5	19.4	0.0	0.0
Staff rooms	375	18.4	20.0	0.1	0.5	35.0	26.7	0.01	0.2
General office	376	7.2	2.7	0.2	0.9	8.5	5.4	0.0	0.0
Computer laboratory	103	29.2	18.5	1.3	2.0	30.7	21.4	0.2	1.7

Note: The means in these tables represent the average numbers calculated for the schools that reported to have the facilities housed in the particular location.
N = Number of schools reporting to have computing/network facilities installed in that location

As can be seen from Table 7.4, which reports the School IT Survey Item 2b, on average 10.5 computers per secondary school have been allocated to general classrooms. This is considerably higher than the overall average of 3 computers per school allocated to general classrooms reported in the Preliminary Study. Those secondary schools that reported having specialised computer rooms, MMLCs or ITLCs indicated an average of 42 computers in computer rooms, 45.2 per MMLC and 38.4 per ITLC. This is slightly lower than the Preliminary Study data of an average 47.6 computers in computer rooms. However, this must be interpreted in the light of two factors: (1) the overall numbers of computers in schools have increased tremendously in other locations, and (2) the likely effect of sampling differences in the two studies. There has also been an increase in the numbers of computers in special rooms for educational purposes (from 10.7 in the Preliminary Study to 16.6 in this Study). Schools indicated an average of 15.5 LCD projectors per school located in general classrooms.

The data collected from the School Visits provide further information about the locations of computers in the sub-sample of schools visited. In some schools there are no computers installed in classrooms but teachers use notebook computers belonging to the school or bring their own. Very often when there is no computer installed in classrooms, teachers use notebooks and in other cases the equipment is wheeled from room to room on a trolley. In some cases, the space limitations in staff rooms restrict the set up of desktop computers for teachers to use but notebook computers were observed to be in common use.

In the School Visits it was also found that all secondary schools had places for student to access computers out of school hours. The provisions were made mostly at recess time and before or after school. Some schools have provisions to make the school IT facilities available for weekend or evening classes.

Table 7.5: Percentage of schools with school website and email accounts for teachers, students and parents (School IT Survey, Q. 4a)

Services	**Number of schools with the services**	**%**
School website	377	99.7
Subject/teaching websites or homepages	334	88.4
Intranet for staff	356	94.2
Teachers' homepages (one or more)	306	81.0
Intranet for students	326	86.2
Students' homepages (one or more)	254	67.2
Email accounts on school email server dedicated to:		
Teaching staff	231	61.1
Students	164	43.4
Parents	42	11.1
Free email accounts from other sources allocated by school to:		
Teaching staff	321	84.9
Students	208	55.0
Parents	64	16.9

N = 378

Table 7.5 shows the percentages of schools with school website and email accounts for teachers, students and parents, as reported in the School IT Survey item 4a. Clearly, nearly all of the secondary schools in the sample have a school website. 231 schools have email servers. 61.1% of the schools have provided email accounts to staff, 43.4% have provided email accounts to students, but only 11.1% have provided accounts for parents. 94.2% of the schools have developed an intranet for staff and 81% or more have subject or teaching websites (88.4%), teachers' homepages (81%) or intranets for students (86.2%).

Connectivity

All secondary schools surveyed reported having connection to the Internet. Of these, 97.6% reported they have broadband Internet connection, and 68.7% have a connection at 10 Mbps or above (School IT Survey item 2c). 96.9% of the responding schools have school intranet (School Heads' Questionnaire item 8). From School IT Survey item 2b(i) it can be seen that while most of the schools have network ports in general classrooms and 61.9% of the respondents to this item have them in 25 or more rooms, 5% indicated that they do not have them in any general classrooms.

96.3%-98.2% of the students from those schools with websites said they knew about this (Students' Questionnaire item 14a), suggesting that there is a high level of awareness among the secondary school students about this facility.

Budgeted Expenditure

Table 7.6: Budgeted expenditure on IT in Education in school for academic year 03/04 (School Heads' Questionnaire, Q. 13)

Items	**Total reported amount**	**% of total expenditure by school on IT**	**Number of schools reporting non-zero expenses**
Hardware	41 165 004	45.7	316
Consumable items and other general expenses	19 515 622	21.7	329
Technical support services (excluding resources/ grants/allowances provided by government)	11 207 115	12.4	265
Software	10 398 336	11.5	312
Professional training/development for staff	2 331 600	2.6	268
Others	5 478 528	6.1	88
Total	90 096 205	100	-

Huge progress in IT infrastructure in schools over the five-year period is not surprising since the EMB Document analysis gives a very clear picture of the extensive amount of financial, advisory and training input, and support given by the EMB. As can be seen from Table 7.6 (School Heads' Questionnaire item 13), the total budgeted expenditure on IT by the responding secondary schools for the academic year 2003/04 was approximately HK$90 million. The highest proportion of expenditure was on hardware, consumables and technical support. Professional development and training for secondary school staff received a very small sum from the school budget in comparison to the amount spent on hardware. However, as explained in Chapter 6, this low proportion of budgets allocated to professional development/training for staff is a consequence of other provisions having been made for this purpose and should not be misconstrued to suggest that this has not been given attention. Most of the school heads regard hardware as the most important element in the ITEd initiative and allocate more expenditure to this than to other areas.

7.1.2 Access and connectivity at home

Home ownership of computers seems to be very common for secondary school staff, as indicated by School Heads' and Teachers' Questionnaire items 1a. 98.9% of school heads and 97.1% of teachers reported that they had at least one computer at home. The student data (Students' Questionnaire item 1) indicate that 97.8% of the S2 students, 98.2% of the S4 students, and 99.5% of the S6 students have at least one computer at home. The pattern is similar for the parent sub-sample (Parents' Questionnaire item 4), with 98.2%, 96.9% and 98.9% of parents of S2, S4 and S6 students respectively reporting they have at least one computer. When averaged out, this is a little higher than the figures for home ownership by secondary students reported in the Preliminary Study (94.8%), which were already quite high, and certainly an increase compared to the SITES-M1 Study which reported that 72% of S2 students, 82% of S4 students and 91% of S6 students owned home computers. These figures are comparable with the data presented by the *Thematic Household Survey on Information Technology Usage and Penetration* (Census and Statistics Department of Hong Kong, 2003) which stated that 97.4% of S6 students, 95% of senior secondary students and 94.3% of junior secondary students have home computers.

Looking closer at the responses from those who reported having computers at home, it can be seen that 96.2% of school heads (School Heads' Questionnaire item 1b), 94.2% of teachers (Teachers' Questionnaire item 1b), and 95.4%-97.5% of students (Students Questionnaire item 1a) reported that they have Internet connections at home. The proportion of students with Internet connections is much higher than that of the Preliminary Study (88.4% of the secondary students with home computers) and a clear increase since the SITES-M1 studies (49%, 58% and 67% of S2, S4 and S6 students respectively with home computers). The pattern for teachers' home ownership seems to be consistent with the Preliminary Study findings, which were already high (96%), and there has been a significant increase from the 71% of teachers reported in the Preliminary Study as having Internet connection at home. This gives the impression that home computer access is widely available, not only for school heads and teachers but also for students.

7.1.3 Usage

According to the School IT Survey (Item 4c), school administration, school library use and teaching and learning were ranked as the most common uses of IT in secondary schools, with means of 4.8, 4.8 and 4.0 respectively on a 6-point scale where 1 represented 'practically no use of IT' and 6 represented 'almost completely IT-based'. Communication with staff and students were also ranked reasonably highly with means of 3.6 and 3.3 respectively. Communication with parents appears to be a less important use, with a mean of only 2.2.

School Heads

Nearly all of the secondary school heads interviewed had their own computers in their offices. During the month prior to completing the questionnaire, the majority of school heads (98.6%) had made at least some daily use of computers at school (School Heads' Questionnaire item 1e). 23.2% said they had used computers for less than one hour per day, 53.2% spent up to two hours per day and a further 28.1% spent two to less than four hours. Only 6.5% said they had spent more than 10 hours. The most common use by secondary school heads (School Heads' Questionnaire item 2) was for school administration (94.3% using computers occasionally or always for this purpose), followed by researching or analysing school data (79.6%). 69.3% said they had used the Internet for inter-school communication and joint school activities. Just over half (52.3%) said they had used it for discussing teaching-related matters with teachers, but less than half had used it for communicating with students (46.3%) or parents (30.4%), or for teaching/training (45.7%).

The usage patterns at home are similar. Only 6% said they had not used computers at home at all during this period (School Heads' Questionnaire item 1c) and 73.7% had used computers at home for up to 2 hours per day, 11.8% spent two to less than four hours, and 5.5% for more than 10 hours. More than 73% used their home computers for job-related tasks (79.3%) or for communication (84.3%) or browsing/searching (73.5%) for information (School Heads' Questionnaire item 1d). Very few used them for other purposes like reading news, entertainment or personal matters like banking.

Teachers

The School Visits and Focus Group Interviews with teachers indicated wide variation in their access to computers for their own use in school. In some secondary schools, there are only three or four computers located in a small room for all the staff to share, whereas in others there is easy and abundant access. The School Survey (item 2b) revealed that 23.8% of the secondary schools surveyed had five or less computers in staffrooms and 55.3% had 10 or less. 13.3% of schools reported having 51 or more computers in staffrooms. In some of the schools observed, teachers are able to borrow notebook computers to take home. Some schools have implemented different policies to encourage teachers' usage, like two teachers sharing one notebook (half a year for each) or the school subsidises a fixed amount of money for teachers to buy their own.

Regarding the purposes for computer use, (Teachers' Questionnaire item 1e), 98.8% of teachers reported having made some use of computers at school. 28.6% of the teachers reported that, in school, they had used computers for less than one hour per day; 53.8% said they had used them for up to two hours per day and 23.2% had used them two to less than four hours. 9.6% reported to have used them for more than 10 hours. 85.3% said they used computers in school for teaching, 69.2% for browsing or searching for information and 63.6% for school administration (Teachers' Questionnaire item 1f). 50.8% of the secondary school teachers reported using school computers for communication, but few for research on teaching.

At home, only 2.7% of the teachers reported having not used any at computers at all (Teachers' Questionnaire item 1c), 58.2% said they had used them for up to two hours and 20.5% for two to less than four hours. 10.6% having spent more than 10 hours per day. The main reason for using computers at home (Teachers' Questionnaire item 1d) was for job-related tasks (82.6%), followed by communication (71.9%) and browsing and searching (71.4%) for information. Similar to findings from school heads, reading news, entertainment and personal matters were not very commonly reported uses by secondary school teachers.

Students

70.2% of S2 students, 49.6% of S4 and 61.4% of S6 students reported having made at least some use of computers at school in the month prior to the data collection (Students' Questionnaire item 2).

97.5%-98.5% of the students had made at least some use of computers at home over the same period, showing clearly that more secondary school students use computers at home than at school. 29.8% of S2, 50.4% of S4 and 38.6% of S6 students reported having no use and 52.5% of S2, 37.5% of S4 and 50.3% of S6 students reported having less than one hour's use of computers at school in the month prior to the data collection. (Note that this question did not specify use at school outside computer lessons.) On the other hand at home (Students' Questionnaire item 1b), 83.2% of S2, 87.1% of S4 and 82.1% of S6 students had spent more than one hour and around half of the S2 and S4 students had spent more than 3 hours per day, with a slight drop in S6 (36.4%). Regarding the nature of computer use, around 80% of the students said they had used computers at school and more than 85% (up to 94.1% of S6 students) at home for school or learning-related activities in the previous month, but with more than 65% doing this kind of activity for less than two hours per day (Students' Questionnaire items 3 and 1c).

From Student Questionnaire item 4 (Table 7.7), it can be seen that the most common use for students of all grade levels is searching for information from the Internet – even more than learning computer skills themselves. The next most common use for all three grade levels is project work (21.4%-31.8%). There is a slightly higher proportion of S6 than of S4 or S2 students searching the Internet for information (from 53.4% and 45.5% of S2 and S4 students to 56.9% of S6 students) and doing presentations (from 13.7% and 12.7% of S2 and S4 students to 18.7% of S6 students). Otherwise there tends to be a drop in the proportions of S6 students using computers for all other listed purposes and using learning software (from 7.4% in S2 to 3.3% in S6). There is also quite a sharp decrease in the proportion of S6 students using self-learning software. For project work there is a decrease from 31.8% in S2 to 21.4% and 24.3% in S4 and S6 respectively.

Table 7.7: Nature of students' use of computers in school (Students' Questionnaire, Q. 4)

Use	S2 (N = 2071)	S4 (N = 2029)	S6 (N = 1840)
	%	%	%
Searching for information on the Internet	53.4	45.5	56.9
Project work	31.8	21.4	24.3
Drilling exercises	4.3	3.9	3.6
Creative work	6.4	5.9	4.7
Presentations/PowerPoint	13.7	12.7	18.7
Learning computer skills	20.6	15.0	10.8
Self-learning software	7.4	5.3	3.3

Note: Multiple response items

Students from all grade levels indicated that the most common location for using computers outside of school hours is their own home (92.1%-94.9%), followed by other people's homes (36.4%, 42.7% and 40%), and then their own school (33.4%, 26%, 41.5%). 23.2% of S2, 19% of S4 and 26.4% of S6 students said they use public libraries. (Students' Questionnaire item 16). Relatively lower percentages of students reported using cyber-cafes (18.4%, 22.5% and 10.3%) and even fewer using community/youth centres (4.9%, 2.8% and 4.4%). As for the primary sector, very few students in the focus group interviews mentioned the use of community/youth centres for IT access.

The students were asked to elaborate further on the average time per day spent, outside school hours, on a range of activities (Table 7.8, Students' Questionnaire item 17).

Table 7.8: Average amount of time spent by students per day outside school hours on various activities (Students' Questionnaire, Q.17)

Activities	S2								S4							
	N	% of students choosing							N	% of students choosing						
		None at all	< 30 min	30 min to < 1hr	1 to < 2 hrs	2 to < 3 hrs	3 to < 4 hrs	≥ 4hrs		None at all	< 30 min	30 min to < 1hr	1 to < 2 hrs	2 to < 3 hrs	3 to < 4 hrs	≥ 4hrs
a	2066	12.9	36.2	31.7	13.8	3.7	0.9	0.9	2024	17.6	38.8	29.2	10.9	2.4	0.4	0.6
b	2064	35.1	39.6	17.1	5.7	1.5	0.6	0.4	2021	38.1	38.0	15.7	6.1	1.1	0.5	0.5
c	2044	27.7	42.5	19.9	7.2	1.5	0.6	0.5	2009	33.1	38.7	20.0	6.5	1.0	0.5	0.1
d	2061	4.5	19.3	34.3	26.2	10.5	2.3	2.9	2024	3.9	17.1	31.9	30.0	10.5	3.0	3.6
e	2051	3.4	9.6	16.4	24.8	18.6	9.1	18.1	2016	3.7	8.8	15.5	27.3	17.7	9.3	17.8
f	2058	24.5	38.8	20.5	10.6	3.1	1.3	1.3	2011	22.8	42.3	20.1	9.0	2.8	1.5	1.7
g	2056	12.9	22.5	22.4	19.3	11.1	4.3	7.6	2026	9.2	18.3	25.0	21.1	11.6	5.1	9.8
h	2056	52.2	22.8	10.4	6.7	3.3	1.9	2.7	2014	56.3	21.8	8.3	6.0	3.5	1.7	2.4
i	2056	14.8	15.5	16.3	18.8	13.4	7.2	14.2	2019	9.8	14.4	15.8	21.0	16.0	7.4	15.7

Activities	S6							
	N	% of students choosing						
		None at all	< 30 min	30 min to < 1hr	1 to < 2 hrs	2 to < 3 hrs	3 to < 4 hrs	≥ 4hrs
a	1834	10.1	37.4	29.7	16.7	3.4	1.3	1.4
b	1832	51.3	34.0	10.2	3.4	0.5	0.3	0.3
c	1822	23.3	41.2	23.0	9.0	2.4	0.4	0.7
d	1832	1.1	18.1	35.1	28.2	11.4	3.3	2.8
e	1834	3.8	14.4	22.4	28.3	16.7	5.7	8.7
f	1828	21.7	45.8	17.9	9.8	2.7	1.3	0.8
g	1833	10.2	27.7	24.8	19.3	8.7	4.4	5.0
h	1830	56.6	24.7	8.4	6.2	1.9	1.2	1.2
i	1833	7.1	19.7	20.4	25.1	12.8	6.4	8.6

a. Assignments
b. Using instructional software
c. Participating in other school/learning related activities
d. Searching for information on the Internet
e. Entertainment
f. Downloading documents/files for learning
g. Downloading music/movies/freeware
h. Communicating with teachers through E-mail/ICQ
i. Communicating with classmates/friends through E-mail/ICQ

Between 64.9% and 87.1% of S2 students, 61.9% to 82.4% of S4 students and 48.7% to 89.9% of S6 students indicated they had done at least some learning-related activities such as completing assignments, using instructional software, downloading documents or files for learning, or participating in other school-related learning activities. One of the biggest differences between S6 and the younger secondary students is in the use of instructional software, with 51.3% of the former not having used this at all compared to 35.1% of S2 students and 38.1% of S4 students. On the other hand, it is clear that entertainment-related activities such as downloading music or movies and using ICQ or email to communicate with classmates or friends are more popular with all secondary students, with about 85.2% to 96.6% of S2, 90.2% to 96.3% of S4 students and 89.8% to 96.2% of S6 students respectively having spent at least some time on these. 95.5%-98.9% of the secondary students reported having spent at least some time on searching for information on the Internet, which could be for either learning purposes or for entertainment.

From the student focus group interviews it was quite clear that entertainment was a dominant use of computers by secondary school students. However, their use is not solely for entertainment. Students seem to have reported higher use of IT for learning purposes in cases where teachers gave them some kind of specific learning targets such as on-line exercises/tests. The student focus group interviews reinforce the student questionnaire data that most computer use at home for learning-related purposes was to find information to support projects. The interview comments also confirm the student questionnaire data that the junior secondary classes seem to have more project work than the senior classes, probably because of the latter concentrating more on preparation for exams. It is of particular interest to note that students often reported that when they are using computers at home they are frequently doing several school-related and entertainment-related activities at the same time, such as doing homework while listening to music and participating in ICQ (some of which is also for the purpose of doing homework or sharing information and which, the students claimed, often saves them the need to have face-to-face meetings to discuss homework assignments). This suggests, therefore, that the picture of students' home use of IT might not be as bad as it seems at face value and that they are not using it solely for entertainment. Whether and how this multi-tasking would affect their learning is something worth exploring.

That older students had placed more importance on using computers for communication is also supported by the data about numbers of email accounts and personal websites (Students' Questionnaire items 18 and 19). The proportions of students with at least one email account are 94.7%, 95.5% and 99% of S2, S4 and S6 students, respectively. 65.7%-76.9% of the students have more than one e-mail account. On the other hand, personal websites were not commonly reported by secondary school students. The majority of students in all three grade levels reported that they do not have any personal websites (66.5%, 67.5% and 72.2% for S2, S4 and S6 students respectively).

It can be noted that the usage patterns indicated by these data are similar to those shown by the students who completed the IT Activity Daily Log, as reported in Section 7.5. Parent data can also be used to triangulate the students' home use of computers. The responses to Parents' Questionnaire item 4b corroborate the students' claims that the most common activity is entertainment, followed by searching for information on the Internet, communication through email or ICQ. There was a successive increase in all these activities from S2 to S6 in the proportions participating.

7.2 Teacher enablement

This section describes secondary school heads, teachers' and IT team members' reports and perceptions of issues relating to teacher enablement. First, it looks at secondary teachers' competence by investigating the extent to which the targets of the *Five-Year Strategy* for teachers' training in IT have been met. Related to this is an examination of the most-used providers of professional development activities and the relative effectiveness of these. Since teacher enablement is linked closely with motivation, the factors that motivate teachers both to learn IT skills and to use them in their teaching have been considered, along with the impact of IT on their teaching. Finally, this section looks at the obstacles and difficulties to implementing IT effectively in education and the teachers' future development needs.

7.2.1 IT competence level of teachers

It is encouraging to see from Table 7.9 (Teachers' Questionnaire item 21) that 93.4% of the secondary school teachers surveyed reported that they had reached at least BIT level or equivalent. 83.4% reported having reached the maximum level of IIT, 34% UIT and 4.3% AIT. When the valid percentage is considered (after excluding those teachers who did not respond to this question), the percentages of teachers reported having reached the levels of BIT, IIT, UIT and AIT were 100%, 89.3%, 36.4% and 4.6% respectively. In the Preliminary Study 78.9% of the secondary school teachers said that they had submitted portfolios for BIT, 22% for IIT and 2.8% for UIT. This, therefore, suggests quite a large increase in the percentages of teachers with these qualifications.

Table 7.9: Highest level of IT competence attained by teachers (Teachers' Questionnaire, Q. 21)

Highest Level attained	%	Valid %	Cum. valid%
AIT	4.3	4.6	4.6
UIT	29.7	31.8	36.4
IIT	49.4	52.9	89.3
BIT	10.0	10.7	100.0
Missing	6.6	--	--
Total	100	100.0	--

N=6497

However, when teachers were asked to rate themselves with respect to their stage of adopting/using IT (Table 7.10, Teachers' Questionnaire item 1g) only 73.6% rated themselves comfortable/confident, competent or creative – interestingly a lower percentage than the school heads' self-ratings (School Heads' Questionnaire item 4) of 84.6%. This suggests that the teachers' self-perceptions of their competence do not match the level of competence implied by the level of training they have attained. This may be at least partly explained by some of the comments from the school heads' and teachers' focus group interviews, which suggested that the quality of the BIT training varied quite considerably from provider to provider. Other contributing factors suggested in the interviews included that in the training courses many teachers learned to use software applications that were not available in their schools, so they soon forgot. There were also comments that some of the training did not match all teachers' needs – some were overwhelmed with skills that they would never use while it was insufficient for others. In addition, they commented that the emphasis in the training programmes was on technological skill rather than integrating IT use into the curriculum or teaching.

Table 7.10: School Heads' and Teachers' self ratings on stage of adopting or using IT (School Heads' Questionnaire, Q. 4; Teachers' Questionnaire, Q. 1g)

Stage	Description	Head (N = 365)		Teacher (N = 6312)	
		%	Cum. %	%	Cum. %
6	Creative (can use it effectively for teaching/administration and integrate into work in creative way)	11.2	11.2	10.3	10.3
5	Competent (able to apply appropriately to conduct/assist teaching)	45.2	56.4	38.8	49.1
4	Comfortable/confident (comfortable and confident in using it for certain tasks)	28.2	84.6	24.5	73.6
3	Beginner (beginning to understand procedures and able to use for certain tasks)	11.8	96.4	20.2	93.8
2	Novice (learning the basic skills but basically not confident and often encounter difficulties)	2.7	99.2	4.5	98.3
1	Non-user (aware of availability but rarely/never use it)	0.8	100	1.7	100
	Total	100	-	100	-

When we look at the areas of IT use in which the secondary school teachers have reported themselves to have achieved basic proficiency or above for use in their teaching (Teachers' Questionnaire item 13), we find that the highest are word processing (93.3%), Internet (80.5%), spreadsheet (72.9%), communication (71.4%), computer operation (70.5%) and presentation software (69.8%). These were also amongst the skills given the highest ratings in the Preliminary Study. It is speculated that these may be tools that are often used by teachers for their teaching preparation and teacher-centred approaches to learning. On the other hand, the competence levels reported in using tools, such as simulations, databases, graphic and design tools are all relatively low, with less than 51% reporting competence to use these in their teaching. It is also interesting to note that only 54.1% of teachers reported that they are proficient in applying/integrating IT into their subject curricula, even despite the fact that 89.3% of them have attained IIT.

In the teacher focus-group interviews, a number of teachers mentioned that after receiving their training they felt they had reached a comfortable level of competence in using hardware and software. Nevertheless, it was noted during the classroom observations that a good number of the teachers observed were still not quite skilful with the technology and some had to call in technicians to help them with setting up. However, in the focus group interviews, several teachers expressed the view that they do not need such a high level of technical knowledge but rather to focus on specific uses in their teaching. As was noted in Chapter 6, the EMB document analysis revealed that the EMB did provide some courses in pedagogical IT use that were well-received by those teachers who participated in them, but there were relatively few teachers who did participate in these.

As for the kind of professional development preferred, the majority of teachers in the focus group interviews expressed a preference for experience sharing sessions with other teachers, particularly those from the same subject area:

> *It will be worthwhile to think about training per subject and the role of experience sharing, say to have some experienced teachers in different subjects to get involved in training to share their experience, or even let them lead or design some workshops for teachers of the same subjects. I think the result will be more effective.*
>
> *It would be better to have teachers who have substantial teaching experience and good pedagogical knowledge as the trainers than to have people from computer firms. Trainers from computer companies are more focused on technical issues.*

One school that was visited had a school-based professional development programme in which competent teachers conducted lunch-time sharing workshops for their colleagues about their use of IT for different purposes. The teachers interviewed in that school said that they welcomed this system. Another good example of experience sharing was seen in a school in which the principal arranges for individual or small groups of staff members to visit and observe good practices in other schools if they are having difficulty implementing IT in their own classrooms. This has proven to be an effective strategy because the teachers come back and attempt to implement what they have seen in the other schools.

As was also mentioned in the Primary School Sector report in Chapter 6, this same issue about the need for experience sharing as a means of professional development was reiterated in the interviews with representatives from the tertiary sector and also with some of the EMB representatives interviewed.

7.2.2 Participation in IT-related development activities and usefulness of this participation

It is encouraging to note that 96% of schools reported that they had an IT Plan/Policy on teacher training/development (School IT Survey item 1h). Development activities provided by schools and the EMB were the most common, with more than 92% of secondary school heads and teachers having participated in school-based development activities since the inception of the Five-Year Strategy (Table 7.11, School Heads' Questionnaire item 3 and Teachers' Questionnaire item 4). This is considerably higher than the 68% of teachers who reported having participated in school-based training courses in the Preliminary Study. 81.7% of school heads but only 55.8% of teachers have received direct training from EMB, which is a similar figure to that reported in the Preliminary Study. There was very little difference reported in the mean effectiveness of the various providers, with all means ranging from 2.5-2.9 for school heads and 2.3-2.5 for teachers on a scale from 0 to 4 where 0 represented 'not very effective' and 4 represented 'very effective'. This suggests that the secondary school heads and teachers perceived the provisions to be reasonably effective. Participation in staff development activities provided by the HKedCity was reported as low (only around 20% of both heads and teachers) compared to 27.8% of teachers in the Preliminary Study although this could depend upon the actual number of activities organised by HKedCity that these data do not report.

Table 7.11: School Heads' and Teachers' participation in professional training/development activities and rating on effectiveness (School Heads' Questionnaire, Q. 3; Teachers' Questionnaire, Q. 4)

Institute	School Heads					Teachers				
	%	N	Rating on effectiveness (0 – 4)			%	N	Rating on effectiveness (0 – 4)		
			Mean	SD	N			Mean	SE	N
a	95.0	357	2.9	0.7	334	92.9	6313	2.5	0.02	5778
b	81.7	349	2.7	0.6	280	55.8	6114	2.3	0.01	3376
c	21.1	304	2.7	0.6	62	18.8	5961	2.4	0.02	1083
d	49.2	323	2.6	0.7	155	46.0	6050	2.5	0.02	2728
e	27.3	300	2.6	0.6	80	20.6	5976	2.4	0.02	1185
f	51.3	306	2.5	0.7	151	38.9	5822	2.4	0.02	2200

a. *Your school*
b. *EMB (Formerly ED)*
c. *HKedCity*
d. *Tertiary institutions*
e. *Non-profit making organizations*
f. *Commercial organizations*

The teachers were asked to indicate the extent of their roles in activities for promoting IT in teaching (Teachers' Questionnaire item 18). About 37.5% said they have occasionally or always participated in planning or promoting the use of IT in teaching or the integration of IT into the curriculum – which shows some promise that a bit more than one-third of the teachers are beginning to take some leadership role. However, only about 28.7% said they have made suggestions occasionally or always about the purchase of software. It does not seem to be conducive to encouraging teachers to use the software effectively in their classes if they have not been instrumental in making the choice of what to use. Only about 17.1% had participated in research on school-based initiatives. Other roles were reported as occurring infrequently: 75.3% said they rarely/never organised/arranged staff to participate in IT training, 80% rarely/never provided/arranged technical support in school, 81.2% rarely/never handled tasks related to the maintenance of IT facilities/resources, and 85.5% rarely/never organised exchange programmes to share experiences with other schools relating to IT in education. When we look at teachers' reported roles in helping colleagues to solve problems encountered in using IT in their teaching (Teachers' Questionnaire item 17) we can see evidence of quite active participation, with 65.1% saying they had done this occasionally or always and only 5.8% saying they had never done this.

7.2.3 Motivation for acquiring IT skills

The main motivations that the secondary teachers identified for learning IT skills (Teachers' Questionnaire item 15) were to improve their teaching (indicated by 78.1%) followed by quest for knowledge (62.7%), the desire to apply IT in teaching (60.2%) and to acquire a basic life skill (59.7%). A minority indicated they had been motivated by extrinsic factors such as promotion prospects or the influence of others, and only 30.2% were motivated by EMB's demand. It is also interesting to note that 46.7% and 47.4% were motivated to learn and apply IT (Teachers' Questionnaire item 16) because of their school head's request or expectation, thus suggesting that the school leader's expectation contributes to teachers' motivation to participate even though it is not the most important one. It is also interesting to note that only 32.7% of the secondary teachers were motivated by students' requests or expectations to apply IT in their teaching.

There is some inconsistency (Tables 7.12 and 7.13) between the high percentage (78.1%) of teachers who reported they were motivated to learn IT skills to improve their teaching, and the relatively low percentage (39.5%) saying that student accomplishment (including enhancing quality of learning) was a motivator for them when it came to actually applying it in their teaching (Teachers' Questionnaire item 16).

In fact, the main motivator for applying IT in teaching was reported to be their growing maturity in IT literacy (62.7%), thus suggesting that as their competence and confidence mature they are more willing to attempt to put IT into practice. The second most commonly reported reason was because it has become a trend in education (48.2%), followed by school head's request/expectation (47.4%).

Table 7.12: Factors motivating teachers to learn IT skills (Teachers' Questionnaire, Q. 15)

Factors	%
Quest for knowledge	62.7
Improve teaching	78.1
Compliments from others	16.6
Apply in teaching	60.2
School/head's request/expectation	46.7
Promotion prospect	7.7
Basic life-skill	59.7
EMB's demand	30.2

Note: N = 6497. Multiple responses items

Table 7.13: Factors motivating teachers to apply IT in teaching (Teachers' Questionnaire, Q. 16)

Factors	%
Maturing in IT literacy	62.7
Students' request/expectation	32.7
School/head's request/expectation	47.4
Students accomplishment (including enhancing quality of learning)	39.5
Colleagues' encouragement	15.0
ITEd policy from government	33.6
Parent's request/expectation	6.2
Trend in education	48.2

Note: N = 6497. Multiple responses items

7.2.4 Impact of ITEd on teachers

Generally, school heads seem to be more optimistic/positive about the impact of IT on education than the teachers. On School Heads' Questionnaire item 9b, the secondary school heads regarded the greatest impacts of IT on teachers' teaching as being increased IT knowledge (100% rating agree or strongly agree), encouragement for teachers to apply IT in their teaching (92.6%), making school administration/management work more convenient for teachers (92.4%) and enhancing co-operation among teachers (85.8%), all with mean ratings of 3 or higher (Table 7.14). The secondary school teachers (Table 7.15, Teachers' Questionnaire item 19) rated the highest impact as enhanced teaching effectiveness (67.6%) and, to a lesser extent, increased awareness of the outside world (51.4%). 63.7% of the school heads thought that the use of IT had encouraged teachers to make more use of student-centred learning and 77.1% thought that it strengthened communication between teachers and students, but the teachers themselves seemed to be much less sure about this, with less than one third suggesting it improved communication and collaboration, even with their own colleagues or with their students. A small percentage of school heads agreed or strongly agreed that there have been negative impacts such as teachers' stress levels (28.6%), self-esteem (2.8%) and confidence (11.2%). A fairly significant proportion of teachers perceived some kind of negative impact on themselves in terms of less time for class preparation (51.3%), less time for student contact (43.9%) and exhaustion or information overload (38.7%). Generally their perception of the impact on collaboration with others is rather low (mostly less than 20%). Whereas 41.4% of school heads agreed or strongly agreed that strengthening communication between teachers and parents was an impact, the corresponding proportion of teachers rating this as an impact was only 16.5%. Generally teachers tended to have a higher awareness of these negative impacts while the school heads expressed more positive views about the impact of IT, which suggests there may be a mismatch in the two groups' perceptions of the stress and time constraints that are really imposed on teachers by the introduction of IT.

Table 7.14: School heads' perception of impact of ITEd on teachers, based on their experience of promoting IT in Education (School Heads' Questionnaire, Q. 9b)

Impact	Mean (0-4)	SD	N	% of school heads choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
Enhanced co-operation among teachers	3.0	0.6	366	16.7	69.1	13.7	0.6	0.0
Increased IT knowledge	3.5	0.5	369	52.0	48.0	0.0	0.0	0.0
Encouraged teachers to adopt student-centered mode of learning	2.7	0.7	367	9.5	54.2	31.9	3.8	0.5
Strengthened communication among teachers and students	2.9	0.7	367	18.8	58.3	21.3	1.6	0.0
Increased interactions with people outside the school, broadening their professional vision	2.9	0.6	368	14.4	61.1	23.1	1.4	0.0
Teachers are not confident in using IT appropriately	1.3	0.8	365	1.1	10.1	20.3	58.9	9.6
Teachers find using IT stressful	1.8	1.0	368	1.4	27.2	27.2	37.5	6.8
Lowered self-esteem and professional confidence	1.0	0.7	367	0.3	2.5	16.6	59.7	21.0
Strengthened communication among teachers	2.9	0.6	367	14.2	62.1	22.3	1.1	0.3
Encouraged teachers to apply IT in regular teaching	3.1	0.5	367	20.7	71.9	6.5	0.8	0.0
Strengthened communication between teachers and parents	2.3	0.8	367	4.9	36.5	47.4	10.6	0.5
Made school admin/management work more convenient for teachers	3.2	0.6	367	28.1	64.3	7.1	0.5	0.0

Table 7.15: Teachers' perceptions of impact of ITEd on themselves since the introduction of ITEd (Teachers' Questionnaire, Q. 19)

Impact	Mean (0-4)	SE	N	% of teachers choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
Enhanced teaching effectiveness	2.7	0.01	6332	7.3	60.3	26.4	4.9	1.1
Exhausted/information overload	2.2	0.01	6038	4.5	34.2	43.3	16.8	1.2
Less time for class preparation	2.4	0.01	6317	10.9	40.4	32.3	15.1	1.3
Less time for contact with students	2.3	0.01	6300	8.7	35.2	35.4	19.1	1.7
Increased awareness about outside world	2.4	0.01	6315	5.9	45.5	34.9	11.7	2.0
Increased awareness about local/Mainland society	2.3	0.01	6305	5.4	40.5	38.6	13.0	2.5
Enlarged social circle	1.8	0.01	6291	2.3	17.9	45.6	27.2	6.9
More collaboration with colleagues	2.0	0.02	6306	1.9	28.6	43.7	21.3	4.5
More collaboration with teachers in other schools	1.7	0.02	6296	1.3	13.9	49.1	28.2	7.5
More collaboration with other organizations	1.8	0.02	6297	1.1	15.8	48.8	26.8	7.5
Strengthened communication with parents	1.7	0.02	6291	1.2	15.3	46.2	28.3	9.0
Strengthened communication with students	2.2	0.02	6307	3.9	39.8	36.6	15.2	4.5
Strengthened communication with school	2.1	0.02	6300	3.4	33.9	40.9	16.5	5.3

There are only very small differences in the mean ratings on the corresponding item regarding the teachers' perceptions of impact of ITEd on themselves in the Preliminary Study.

7.2.5 Obstacles and difficulties faced by teachers

The difficulties described by secondary school heads, teachers and IT team members are similar (School Heads Questionnaire item 18, IT Team Members' Questionnaire item 4 and Teachers' Questionnaire item 6). The main problems cited by the school heads were teacher workload (94.3% citing this as a problem), teachers lacking skill to apply IT to education (86.2%), lack of suitable educational software and teaching resources (89.3%) (also cited as a major obstacle in the Preliminary Study) and the demand for teachers to spend time preparing their own materials detracting from the quality of their teaching (88.1%). This issue also came up in the school heads' interviews, with many commenting that there is too much duplicated effort with all schools going through the same exercise of finding, evaluating and deploying software rather than having enough unified support from a central authority to undertake these roles. The teachers commented that they need teaching materials, but they complained that much of the publishers' software is just text based and does not meet their needs. 65.3% of the school heads also indicated that the existing curriculum is not conducive to IT applications inside the classroom, which was also supported by 57.1% of the teachers, although relatively few rated this as a serious or very serious problem. The major difficulties encountered by teachers when using IT in their teaching were heavy workload (identified by 85.3%) and the time required to prepare materials detracting from their teaching (77.9%). The workload problem was also rated highly by the IT team members (82% rating their own workload as a difficulty and 87.8% rating their colleagues' workloads as an inhibiting factor). Quite a high percentage of IT team members (83%) regarded teachers' lack of skill or knowledge as an obstacle, but only 65.4% of the teachers themselves said this was an obstacle. The discrepancy suggests that the school heads' and IT team members' perception of teachers' lack of skill or knowledge as a factor inhibiting IT use in class is not shared by as many of the teachers. Even so, given the substantial percentages of teachers who have attained IIT, as reported above, 65.4% is still quite high, although it must be noted that in both cases relatively few think of it as a serious/very serious problem. In a similar vein, lack of interest was rated as an obstacle by 76.9% of the school heads and 79% of the IT team members but only 40% of the teachers. While a high percentage of school heads regard lack of software and teaching resources as a problem, fewer IT team members (75.1%) and teachers (69.9%) see this as an obstacle. This is still a high percentage, but the data suggest that the highest percentages of teachers see the real reasons for not using IT as being the workload and time issues, more than their lack of skills, interest or resources.

In the focus group interviews the main obstacles identified by the teachers echoed some of the issues discussed above, including lack of resources, lack of time and excessive workload. Another obstacle that was raised in the interviews is that, especially in poorer socio-economic areas, most of the teachers' time is spent in tackling disciplinary and classroom management issues, hence IT is given less priority. Some teachers said that one of their main reasons for not applying IT is the exam-oriented environment and tight schedule under which they revert to using the teaching methods that do not require too much preparation or collection of data/information, since their students' prime concern is getting good examination results. It is apparent, then, that the 'backwash effect' of the public examination system and the curriculum on teaching also has an effect on the use of IT in teaching.

7.3 Curriculum, pedagogy and resources

This section begins by looking at the secondary school teachers' beliefs about IT in education, particularly their primary objectives for using it in their teaching. Their common beliefs are then used as a basis for examining what occurs in actual practice. This examination focuses on the actual hardware and software that are used and the ways in which these are used, in order to examine whether these practices are in fact conducive to promoting effective teaching and learning. The section also examines schools heads' and teachers' perceptions of the impact of IT on the curriculum and teaching approaches, and finally considers the priorities of support needs seen as perceived by different stakeholder groups.

7.3.1 Teachers' beliefs about ITEd

This section will begin with a discussion of teachers' perceptions of and beliefs about the actual and potential impacts of IT on their teaching, as well as an examination of the matches or mismatches between their beliefs and their actual practices. While there are some interesting results reported below regarding teachers' perceptions of IT in teaching, it is also worth noting that at this stage of the initiative there is no overwhelming support with respect to perceived benefit in using IT for assessment.

When we examine the secondary school teachers' primary objectives for using IT in teaching (Table 7.16, Teachers' Questionnaire item 11), we can see that the majority said that they should place high priority on objectives like enhancing teaching effectiveness (77.6%) and providing students with more opportunities for self-learning (75.8%). Objectives concerned with communication and collaboration are given relatively lower priority: communication among students (45.6% agreeing/strongly agreeing that this is a primary objective), communication between students and teachers (49.7%), communication between school and parents (38.2%) and opportunities for students to work collaboratively (48.4%). It appears, therefore, that their espoused thoughts are at least to some extent aligned with student-centred learning – which may well be seen as a positive sign since it is necessary for them to believe this before they can actually put it into practice.

Table 7.16: Teachers' primary objectives for using IT in teaching (Teachers' Questionnaire, Q. 11)

Objectives	Mean (0-4)	SE	N	% of teachers choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
To realise effects that can only be achieved by using IT	2.6	0.01	6182	12.2	47.9	31.2	6.9	1.8
To enhance teaching effectiveness	2.9	0.01	6259	13.6	64.0	19.2	2.5	0.7
To strengthen communication among students	2.3	0.01	6213	5.4	40.2	40.5	11.8	2.2
To provide more opportunities for student to work collaboratively	2.4	0.01	6220	4.6	43.8	39.6	10.2	1.9
To strengthen communication between teachers and students	2.4	0.01	6215	6.1	43.6	38.0	9.9	2.4
To strengthen communication between the school and parents	2.2	0.01	6200	3.6	34.6	44.0	14.2	3.6
To provide students with more opportunities for self-learning	2.9	0.01	6244	14.5	61.3	20.3	3.0	0.9
To provide students with more opportunities for self-assessment	2.5	0.01	6215	6.4	46.8	38.6	6.7	1.6
To assist students with learning difficulties or special education needs by specifically designed software/hardware	2.4	0.01	6194	5.2	43.9	41.1	7.3	2.5
To assist the development of gifted students by using specifically designed software/hardware	2.4	0.01	6193	5.4	43.0	41.6	7.5	2.5

Table 7.17: Teachers' perceptions of their main roles in lesson with IT application with which they were most satisfied (Teachers' Questionnaire, Q. 14d)

Roles	Mean (0-4)	SE	N	% of teachers choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
Transmit correct knowledge to students	3.3	0.01	6111	35.8	57.2	5.6	1.1	0.3
Allow students to do drilling exercises with the computers	1.9	0.02	5932	3.7	28.2	35.0	24.2	8.9
Provide appropriate learning materials and activities to enable students to understand the subject content	3.0	0.01	6080	20.1	64.2	13.4	1.7	0.7
Engage students in small group activities in problem analysis and information searching	2.4	0.02	5998	8.9	46.7	28.3	10.7	5.4
Provide opportunities for students to learn through creative activities	2.5	0.01	5995	10.5	46.5	28.3	9.8	4.9
Teach students new knowledge	3.1	0.01	6055	22.8	62.6	12.2	1.8	0.7
Provide diversified exercises/practices	2.7	0.01	5988	12.5	55.5	22.5	6.2	3.3

As can be seen from Table 7.17 (Teachers' Questionnaire item 14d), when it comes to actually describing their use of IT in the lessons with which they were most satisfied, the secondary school teachers' paradigm still seems to be very much content oriented, with very high proportions seeing their main roles being to transmit knowledge (93%), teach new knowledge (85.4%) and provide learning materials and activities to enable students' understanding of subject content (84.3%). On the other hand 57% or less emphasised student engagement in problem-solving, information searching or creative tasks. It can thus be seen here that the teachers are still seeing their roles more as transmitters of information/knowledge than as facilitators of learning. Compared to the results of the parallel item the Preliminary Study, there is a slight increase in the teachers' priorities and perceptions of their roles as facilitators of student learning. The lowest rating (31.9%) was given to the use of drilling exercises, which may be an encouraging indication that they are moving away from the belief that this is the most effective use of IT, although this also had one of the lowest mean ratings in the Preliminary Study.

The patterns of teachers' use of IT are reinforced by the students' perceptions of the lessons using computers they liked the most (Students' Questionnaire item 13d). When asked to describe the teachers' roles during these lessons the most common were transmitting a lot of correct knowledge (rated as agree/strongly agree by 78.5% of S2, 77.5% of S4 and 77.8% of S6 students), teaching new knowledge (78.1%, 78.1% and 77.2%) and providing appropriate learning materials and activities to enable understanding of the subject content (68.5%, 67.9% and 71.4%). The teacher's role in providing drilling exercises was described by 48.6% of S2 but only 30.6% of S4 and 19.4% of S6 students. Similarly the percentage rating provision of opportunities to learn through creative activities was higher for S2 (51.3%) than S4 (35%) and S6 (26.7%). Engagement in small group activities in problem analysis and information searching was rated highly by 50.4% of S2 students, 39.5% of S4 and 41.8% of S6.

From the teacher focus group interviews it was found that most teachers still consider themselves to have achieved the target of using IT by using PowerPoint presentations in class. From the discussions after the classroom visits, it was observed that a lot of teachers see IT as a way to make lessons more interesting or attract students' attention, rather than a tool to facilitate students' learning. This belief can be illustrated by the following comment from one of the teacher focus group interviews:

> *IT can help to visually illustrate abstract issues more concretely so that students can get hold of the idea easier. It helps to attract students' attention to a certain extent.*

There were two interesting, contrasting, cases of teachers' approaches to using IT presented in the teachers' focus group interviews. Both teachers found that at first the students were more focused when they used PowerPoint for presentations, but after some time they began to notice that the students were losing interest. One teacher tried to compensate for this by using more attention-grabbing gimmicks such as animation, Flash etc. The other teacher came to realise that using PowerPoint was in fact no different from using the blackboard. So he tried to think of how to make better use of other IT tools to his repertoire to improve his teaching effectiveness. He moved on to using Excel to input data that were collected directly from the class and to create different types of graphs with these data. Even though he was still using the IT as a demonstration tool rather than the students having hands on, this change brought about an increase in the students' interest and understanding of the effects of different types of graphs.

In the post classroom visit interviews, many teachers said that using IT in teaching can increase students' attention and concentration and make it easier to draw their attention, that information searching is useful and convenient, that IT encourage students to enjoy the class, can improve their studying skills, and make the contact more tangible and real. However, some also pointed out some disadvantages: students can feel bored if using IT (especially PowerPoint) too often, and students are given insufficient time and opportunity to be fully interactive with IT in their learning.

As with the primary school teachers, some secondary teachers indicated that they know there is more to ITEd than using PowerPoint presentations but find it difficult or even do not know how to do more. There is still a perception that good use of IT in teaching means good use of visual and audio impact such as animation facilities, rather than good pedagogical use of IT as a tool to stimulate thinking or facilitate students to construct their own knowledge. It also seems to be common practice for teachers to ask students to use PowerPoint to present their assignments or projects without much guidance about how to make effective presentations.

7.3.2 Actual practices: Curriculum integration

When asked to rate the extent to which IT had been adopted in key learning areas (KLAs), more than 91% of the secondary school heads surveyed painted the positive picture that it is indeed used occasionally or always across all KLAs. The only one rated as used occasionally/always by a smaller percentage of school heads is Physical Education (46.6%), which is understandable because of the nature of the subject (Table 7.18, School Heads' Questionnaire item 6).

Table 7.18: Extent to which IT had been adopted in teaching in different KLAs (School Heads' Questionnaire, Q. 6)

KLA	% of school heads choosing the option				N
	Always	Occasionally	Rarely	Never	
Chinese Language Education	31.3	60.5	8.2	0.0	367
English Language Education	38.3	56.0	5.7	0.0	368
Mathematics Education	30.4	62.5	7.1	0.0	368
Science Education	65.9	32.8	1.4	0.0	369
Technology Education	79.2	18.9	1.6	0.3	366
Personal, Social and Humanities Education	32.5	61.8	5.5	0.3	366
Physical Education	1.1	45.5	50.1	3.3	367
Arts Education	35.5	57.1	7.1	0.3	366

With the exception of Physical Education, more than 91% of the school heads indicated that IT had been adopted in teaching occasionally or always in all of the KLAs. Science Education and Technology Education were the two rated by the highest proportions of school heads (98.7% and 98.1% respectively). Of course, however, it is important to note here that these items were concerned only with use and non-use, not with whether or not the IT was used in the right ways.

The actual practices reported by the secondary school students (Table 7.19, Students' Questionnaire item 6), however, suggest that the use of IT is much lower across the curriculum areas than implied by the school heads, with very low percentages of students reporting that IT had been used in lessons in the past month, except with the obvious exception of Computer Studies (91.5% of S2 students, 32.8% of S4 students and 14.7% of S6 students). 34.4% of S2 students, 31.3% of S4 students and 44.1% of

S6 students said that computers had been used in their Chinese language classes. The other more frequently reported subject areas were English language (33.1%, 34% and 48.8% of S2, S4 and S6 students respectively), and, for S2 students, Integrated Science (40.5%) and Art and Design (37.6%). All of the other subject areas were below 29%. However, when these figures are compared with the Preliminary Study it appears that there has been quite a significant increase in use reported by students, although it must be noted that comparisons can only be broad and approximate because not all subjects match exactly.

Table 7.19: Subjects having involved the use of computers in the past month as reported by students (Students' Questionnaire, Q. 6)

Subject	S2 (N = 2071)	S4 (N = 2029)	S6 (N = 1840)
	%	%	%
Chinese Language/Chinese Literature	34.4	31.3	44.1
English Language/English Literature	33.1	34.0	48.8
Mathematics	21.8	23.5	6.9
Putonghua	21.8	2.4	1.1
Chinese History	28.9	16.5	8.4
History	25.3	9.0	8.4
Integrated Science*	40.5	1.3	0.4
Physics	0.8	21.0	20.0
Chemistry	1.6	20.0	21.4
Biology/Human Biology	0.9	24.2	16.6
Economics/Economics and Public Affairs/ Commence	13.2	19.2	14.9
Geography	24.9	24.3	15.3
Social Education/Sociology/Psychology	4.8	1.2	1.8
Engineering/Design/Electronics/ Science and Technology	9.3	2.9	0.8
General Education	3.5	0.6	3.8
Music	28.1	11.5	4.5
Computer Studies	91.5	32.8	14.7
IT	21.5	17.1	2.9
Ethics and Religion Studies	11.4	11.5	8.7
Home Economics	13.8	1.0	0.4
Art and Design	37.6	7.8	0.9
Physical Education	3.4	4.0	2.9

*Note: * Many schools offer Integrated Science instead of Physics, Biology and Chemistry for S.1 to S.3.*
Multiple response items

7.3.3 Actual pedagogical use by teachers

Table 7.20: Frequency of computer use by teachers during class in past month as reported by students (Students' Questionnaire, Q. 7)

Frequency	S2 (N = 2058)		S4 (N = 2021)		S6 (N = 1833)	
	%	Cum. %	%	Cum. %	%	Cum. %
Almost daily	13.2	13.2	18.9	18.9	27.9	27.9
2-3 times a week	34.7	47.9	33.9	52.8	25.8	53.7
About once a week	20.9	68.8	14.5	67.3	13.9	67.6
2-3 times per month	24.1	92.9	20.4	87.7	23.1	90.7
Not at all	7.1	100	12.3	100	9.3	100
Total	100	-	100	-	100	-

The data shown in Table 7.20 (Students' Questionnaire item 7) add further strength to the observation that more is being said than actually done. Whereas very high percentages of school heads reported at least occasional use, only around half of the students reported their teachers having used IT in class for two to three lessons per week or more. This is, however, higher than the corresponding figures reported in the Preliminary Study, where only around 25% of S2 and S4 students and 35% of S6 students reported their teachers using computers in class at least two or three times a week or more.

When comparing the figures of "almost daily" use we can also see an increase since the Preliminary Study, from 4.3% to 13.2% for S2, from 7.2% to 18.9% for S4 and from 16.1% to 27.9% for S6 students. Similarly the proportions reporting "no use at all" have dropped from around 17% to 24% for all grade levels in the Preliminary Study to 12.3% and less in this Study. In the teacher focus-group interviews most of the teachers claimed that they had reached the target set by the Government of using IT for 25% of their curriculum. However, during the School Tours widespread computer use was not obvious. Some teachers using IT in classes visited by the Project Team admitted that they would not have used it if their classes were not being observed.

Teachers' self-reports of the software they are using (Table 7.21, Teachers' Questionnaire item 12) are consistent with other data suggesting that word processing software is being used a lot in teaching (96.4% saying they use it occasionally or always), followed by spreadsheet software (79.3%), presentation software (77.8%), communication software (73%) and software developed by textbook publishers (72.6%). Relatively little use is made of simulation software (30.2%) or of educational software developed by the school or by EMB (former ED), both being around 24%.

Table 7.21: Frequency of software used in teaching reported by teachers (Teachers' Questionnaire, Q. 12)

Software	**% of teachers choosing the option**				**N**
	Always	**Occasionally**	**Rarely**	**Never**	
Word processing software	80.4	16.0	2.8	0.8	6298
Spreadsheet software	39.3	40.0	15.4	5.4	6276
Database software	22.9	37.8	27.5	11.9	6217
Presentation software	42.0	35.8	16.2	6.0	6230
Communication software	39.7	33.3	19.7	7.3	6237
Web design software	12.2	31.4	39.9	16.6	6232
Audio/video editing software	10.2	31.7	39.3	18.8	6234
Graphics editing/drawing software	18.9	37.7	30.4	13.0	6232
Multi-media software	19.4	41.4	29.0	10.2	6233
Simulation software	5.4	24.8	42.2	27.7	6198
Practice and drill software	6.8	32.0	40.1	21.1	6216
Educational software developed by yourself	11.0	26.8	30.9	31.2	6232
Educational software developed by your school	3.6	20.7	35.3	40.4	6199
Educational software developed by EMB (Formerly ED)	2.6	21.1	39.4	36.9	6211
Educational software or teaching materials obtained from HKedCity (HKedCity.net)	5.1	28.9	35.4	30.7	6213
Educational software developed by other government departments/voluntary organizations/tertiary institutions	3.7	27.0	38.6	30.7	6201
Educational software provided by textbook publishers	25.2	47.4	20.6	6.8	6258
Educational software developed by other software vendors	7.6	38.1	35.5	18.9	6195

Table 7.22: Nature of use by teachers of IT in teaching-related activities (Teachers' Questionnaire, Q. 8)

Nature of use	**% of teachers choosing the option**				**N**
	Always	**Occasionally**	**Rarely**	**Never**	
Preparing teaching notes/course materials	59.7	34.5	5.1	0.7	6339
Searching for information, new pedagogy, teaching materials, etc.	46.8	44.3	8.1	0.8	6316
Designing inter-class activities and assignments	21.9	47.1	25.6	5.5	6303
Managing, administering and collecting student tests	20.3	30.1	31.9	17.8	6287
Discussing and communicating with students	8.6	35.1	39.5	16.9	6280
Discussing teaching-related matters with other teachers	5.9	26.1	43.1	25.0	6276
Carrying out collaborative projects with other schools	4.9	19.5	30.9	44.8	6246

From Table 7.22 (Teachers' Questionnaire item 8) it can be seen quite clearly that teachers are using computers in secondary schools especially for searching for information and preparing teaching materials, with more than 91% compared to 76.6% reported in the Preliminary Study, using it occasionally or always for these purposes. IT definitely has become a more regular part of their culture and their daily routine. However, there are still 56.4% of respondents who have never or only rarely used it to communicate with students and 68.1% who have never or only rarely used it to communicate with colleagues in ways that could enhance effective collaboration. Also, from the teacher focus group interviews it was evident that most of the teachers' use is still limited to the use of presentation software although a small percentage said they give project-based homework to their students. However, most of the projects are in the form of take-home assignments rather than being completed in class. In relation to project-based work, students mostly use IT in the form of searching the Internet for information. It must also be noted, however, that this kind of individual or group work is not very feasible in the current setup in most schools, as most computers are located in special rooms (such as MMLC, computer room) whereas students spent most of their time in regular classrooms.

Table 7.23: Teachers' allocation of time for different purposes in their most satisfying lessons with IT application (Teachers' Questionnaire, Q. 14b)

Purposes	% of teachers choosing the option					N
	All of the time	**Most of the time**	**Half of the time**	**A small of proportion of time**	**None of the time**	
Teacher explaining and demonstrating to whole class	4.8	29.9	36.3	27.4	1.6	6063
Students working individually with the computers	0.6	10.9	22.9	37.9	27.6	5678
Students working in group with the computers	0.5	5.9	13.6	38.9	41.1	5581

When students were asked to report their perceptions of the lesson using computers that they like the most (Students' Questionnaire item 13c), 73.1% of S2, 78.3% of S4 and 75.1% of S6 students reported that their teachers had been explaining and demonstrating to the whole class for at least half of the time. On the other hand, 65.6% of S2, 80.4% of S4 and 80.4% of S6 students said students had worked individually with the computers a small proportion or none of the time and 78.9% of S2, 86.7% of S4 and 86.8% of S6 students said students had worked in small groups with the computers a small proportion or none of the time.

From Table 7.23 (Teachers' Questionnaire item 14b) we can see that, in the lessons with IT application with which the teachers were the most satisfied 71% of them said their role had been explaining and demonstrating to the whole class for half, most or all of the time. On the other hand, there were relatively few instances of students working individually with the computers (27.6% of teachers saying this did not happen at all and 37.9% only a small proportion of the time) and even fewer of students working in groups with the computers (41.1% of teachers saying this did not happen at all and 38.9% only a small proportion of the time). This supports the evidence reported in the Preliminary Study that the most common practices are teacher centred, and the qualitative data corroborate these findings further.

As far as teachers' reporting of use of IT in student evaluation (Teachers' Questionnaire item 9a) is concerned, there is evidence of a growing interest in use of IT for this purpose. 49.6% of teachers reported that they occasionally or always use IT for evaluation and 61.7% for processing student evaluation data. Only around half or less of the teachers reported that saw benefits in using IT for evaluating students (Teachers' Questionnaire item 9b). 51.5% said it allows greater flexibility in both time and place for evaluating students, 43.9% that it is easier to follow up on student evaluation, 37.1% that it is easier to relate evaluation results to students' weaknesses, 35.8% that in enables students to conduct self-review and self-evaluation on their own initiative, and 36.7% that it supplements existing evaluation tools. More teachers seemed to be aware of the benefits of using IT for processing student evaluation data (Teachers' Questionnaire item 9c), 67.9% saying that it is faster to obtain the evaluation results and 55.4% that it allows for more accuracy in evaluation results. However, only 44.9% agreed that student performance can be evaluated in greater detail, 35.2% that it is easier to follow up on student evaluations and 34.7% that it is easier to relate evaluation results and students' weaknesses.

When asked to comment on the use of IT to cater for individual students' needs (School Heads' Questionnaire item 7), 98.4% of the secondary school heads indicated that it had been used in certain subjects for practice or individual counseling to strengthen learning outcomes, but less reported any cases of tailoring for various kinds of individual differences in the classroom: students with special learning needs (28.4%), remedial programmes (55.8%) and gifted students (38.6%). Nevertheless, there is a marked increase from 20%-30% reporting this kind of use in the Preliminary Study to 28.4%-55.8% in this Study.

The patterns described above are reflected further in the qualitative data. While teachers said in the focus group interviews that one of the main reasons for using IT was to invoke student interest and make learning more exciting, interesting and motivational – which is not necessarily a good way of conceptualising the role of IT – it was noted during classroom observations that some students were losing interest over a period of time and in some cases were quite obviously bored during lessons where the teacher was using IT. This was particularly in cases where the teacher simply showed some kind of animation, without any interaction or explanation, then gave the students follow-up exercises to complete on paper at the end of the presentation. In fact, in the student interviews it was expressed by some, particularly S6, students that they would prefer their teachers to use IT less because of the time wasted by the teacher setting up and operating the technology. They made it clear that it is the teacher's ability to interact effectively with the class that creates effective learning, not necessarily the technology and certainly not the technology alone. They also mentioned that if the teacher uses PowerPoint to present notes, it requires them to have to copy these notes more quickly, whereas if the teacher is writing the notes on the board the pace is slower. On the other hand, the students did mention that it is sometimes easier to follow the teacher's PowerPoint notes because the writing is more legible and the main points are highlighted, thus making it easier to remember. Clearly, both of these perceptions suggest the idea of teaching that is very much teacher dominated, with students in the passive role of listening and copying the teacher's notes verbatim, and that the use of IT has not changed this approach at all, with the teachers not even making the notes on the PowerPoint slides available to free the students' time for more higher-order tasks. The students even went as far as to say that using IT in class sometimes slows down the pace of covering the curriculum and creates a need for some supplementary classes. A further obstacle expressed by students was that there is often a storage problem if their project files are too big, and that this creates difficulties in submitting assignments either on floppy disk or by email.

From the qualitative data there is evidence to suggest that teachers' integration of IT into the curriculum seems to be a slow process and often occurs as a consequence of trying and having success with some small, sometimes lower level, tasks and progressively becoming more adventurous. This process is illustrated by the following comment from one of the school heads interviewed:

> *At the very beginning, teachers were worried about using IT in Education. Some of them even resisted the change. Encouraged by [the principal], teachers started using IT for word processing, which was mainly for making notes and test papers. Then, they learnt checking and sending emails via the Internet. And then they employed PowerPoint to assist the presentation of teaching materials. I have used a progressive approach to encourage teachers to meet the target of 25% IT in Teaching.*

<u>7.3.4 Use of school website/intranet</u>

When asked how they use their school website (Students' Questionnaire item 14b), the students reported that the highest use was in reading announcements, although only 66% of S2 students, 60.8% of S4 and 61.2% of S6 students reported doing this occasionally or always (Table 7.24). There is little evidence suggested by the students' reporting that the school website is being used in the teaching and learning process for promoting interaction or tasks requiring higher-order thinking.

Table 7.24: Frequency of student use of school website for different purposes (Students' Questionnaire, Q. 14b)

Purposes	S2					S4				
	% of students choosing the items				N	% of students choosing the items				N
	Always	Occasionally	Rarely	Never		Always	Occasionally	Rarely	Never	
1.	20.5	45.5	26.4	7.7	1917	12.8	48.0	29.5	9.8	1902
2.	11.7	26.7	40.5	21.1	1916	9.4	31.4	37.4	21.9	1900
3.	9.8	23.5	36.5	30.2	1917	6.8	21.3	38.0	33.9	1902
4.	7.1	19.7	35.1	38.1	1914	3.2	17.3	36.7	42.9	1902
5.	4.8	13.4	33.1	48.8	1914	2.6	12.3	32.5	52.6	1902
6.	6.7	12.6	30.1	50.5	1911	4.0	12.1	28.9	55.1	1899

Purposes	S6				
	% of students choosing the items				N
	Always	Occasionally	Rarely	Never	
1.	17.2	44.0	27.9	10.9	1792
2.	13.1	28.2	32.5	26.1	1792
3.	7.8	13.9	31.8	46.5	1793
4.	2.1	8.9	31.0	58.1	1793
5.	1.8	9.5	26.6	62.1	1793
6.	3.8	11.6	26.0	58.7	1790

1. Reading announcements or searching for information released by the school/interest clubs
2. Downloading learning materials (e.g., notes, references, assignments, suggested answers for tests/exercises)
3. Uploading assignments/exercises
4. Participating in online tests/examinations
5. Checking the grades or feedback on your assignments given by the teachers
6. Participating in forums/discussion groups

7.3.5 Perceived impact of IT on teaching

Data were collected to describe the extent to which the school heads and teachers had perceived IT to have had an impact on teaching and the curriculum. The school heads seem to have higher opinions about the impact that has occurred. The highest perceived impacts (School Heads' Questionnaire item 9d) are the integration of IT into the curricula of different subjects (92.1%) and increased project-based and collaborative activities (90.7%). Lower, but still more than 65%, are strengthened collaboration among different subjects (65.7%) and increased practicality in curriculum (66.8%). These are followed by facilitated curriculum integration (50%), requirement for more adjustments to class schedule (37.9%), increased collaborative programmes with other schools/countries (30.9%) and reduced teaching hours of other subjects (12.3%). These patterns are almost identical to the corresponding item in the Preliminary Study.

Regarding the teachers' perceptions of the impacts of IT on teaching (Teachers' Questionnaire item 3a), more than 70% agreed or strongly agreed that there has been an increase in the percentages of teachers in their schools using IT for teaching and a substantial improvement in the IT resources for themselves and their students. However, as was reported earlier, the students themselves did not report satisfaction with the availability of resources. Furthermore, (Teachers' Questionnaire item 3b) 77.8% said they have made more use of IT resources for teaching, 70.4% have made use of it to enhance their teaching effectiveness, 66.4% have used it to assist in teaching-related work such as processing student attendance records, but only 53.9% said they have requested their students to use IT in completing their assignments. Thus, again, the evidence supports that teachers are using IT but mostly for preparation, administration and teacher-centered kinds of actions, while less than half are actually directing students to use it in their work, and even less are providing proper guidance to students to do so.

It is particularly important to note that, as in the Primary School Sector data, there is some discrepancy between what the school heads perceive is happening and what the teachers and students report as happening.

7.3.6 Resources and support

As reported in Section 7.1.1, most of the schools' IT budget expenditure was on the infrastructure and technical aspects, including hardware, consumables and technical support. The high priority given to infrastructure is substantiated by more than 90% of teachers indicating a wide range of hardware and peripherals available in their schools (Table 7.25, Teachers' Questionnaire item 2a). However, when this is compared to the actual use, it can be seen that, apart from black-and-white printers (96.7% reporting use occasionally or always), the Internet (95.1%), desktop computers (93.6%) and file server storage space (87.7%), the actual use of some items is rated particularly low. Granted that some of these are fairly specialised pieces of hardware that would not normally get a lot of use, but others, such as online teaching and even the use of educational software, are considerably lower and this could be a cause for concern.

Table 7.25: Availability and extent of use of IT facilities/services by teachers in schools (Teachers' Questionnaire, Q. 2a)

Facilities/Services	% of teachers indicating availability	N	Extent of use in previous year				
			% of teachers choosing the option				N
			Always	Occasionally	Rarely	Never	
Desktop computer	94.7	6299	69.3	24.3	5.7	0.7	5772
Notebook computer (for use in school)	92.3	6250	36.5	27.9	24.0	11.6	5564
Notebook computer (for take-home use)	67.5	5992	22.3	22.5	23.0	32.2	3888
Internet	99.3	6336	72.6	22.5	4.4	0.6	6070
E-mail account provided by school	95.7	6299	42.2	28.1	22.3	7.5	5842
File server storage space	98.6	6254	64.1	23.6	9.5	2.7	5927
Digital camera/video camera	95.0	6236	10.8	33.3	35.8	20.1	5717
Printer (black-and-white)	98.8	6322	81.4	15.3	2.9	0.5	6025
Printer (colour)	94.0	6264	19.1	37.5	32.4	11.0	5697
Visualiser	91.4	6222	15.3	27.0	31.9	25.8	5502
CD Writer	97.9	6280	12.1	37.9	34.7	15.3	5945
Educational Software	95.2	6261	23.7	49.0	23.1	4.3	5753
Online teaching/learning platform	84.0	5902	14.3	37.4	34.8	13.5	4779

When teachers were asked to rate the sufficiency of the school's IT facilities to support their teaching (Teachers' Questionnaire item 2b), more than 49% indicated that it was quite or very sufficient. The only notable exception to this was curriculum support, which only 37.5% of the teacher respondents rated as sufficient. This may partially may explanation why "integration and further use" has not occurred to the desired extent.

For the students' perceptions, in most cases, less than 46% of students saying the facilities were sufficient (Students' Questionnaire item 5). More S6 students were satisfied with the types and numbers of computers than students in the lower grades, and more S2 students were satisfied with the software and technical support. However, it is unclear how seriously to take these comments because, when asked in the focus group interviews, the students who said there were insufficient computers in their schools actually admitted that they had not made any attempts to use school computers outside class time.

Around half of those teachers who used resources and support services provided by EMB (Teachers' Questionnaire item 5), such as Hotline, Regional Support Services and Technical Support Service, rated these as satisfactory, but usage was quite low with less than 29% of teachers indicating they had used them. The only exception was HKedCity, which 63% of the teachers reported having used.

Most of the teachers reported that they use HKedCity frequently but their opinions were divided about its user friendliness. On one hand were those who found it to be very beneficial, as indicated in the following teacher's comment:

> *HKedCity is a very good platform. We could get a lot of references and materials up there. EMB should gather together a group of education experts to further develop this platform. It*

> *is a very economical and effective way to help the schools.*

On the other hand, some of the teachers said that it is not set out very well for finding information and that there are too many resources without an organising structure such as recommendations and user comments:

> *Teaching materials provided by Publishers are not appropriate; it's unrealistic to expect that teachers could create all the necessary teaching materials. Some information could be found on HKedCity, but it's not very organized.*

Most teachers said that they would be willing to contribute their teaching materials to HKedCity but they are concerned about copyright and licensing issues because they use materials from other websites to make up their materials.

Students, on the other hand, did not indicate as high a use of HKedCity (Students' Questionnaire item 22). The proportion who reported having made use of it, or even having looked at it, is quite low (39.2% for S2, 39.6% for S4, and 44.6% for S6), although more than 74% of those who have used it reported it as being average to very helpful (Students' Questionnaire item 22a).

When asked to identify their main sources of support when they encounter difficulties in using IT (Teachers' Questionnaire item 7), the majority of teachers indicated that, other than school-based technical support (69.5%), they seek it from colleagues (71.3%), school IT Team members (65.5%) and to a lesser extent from friends or relatives (55.2%) rather than turning to other sources such as self-help strategies (33.9%) or EMB (1.5%). This is a similar pattern to that reported in the Preliminary Study. Students also indicated that most of their support (Student Questionnaire item 25) comes from their classmates or friends (around 90%), teachers (an interesting decline from 83.4% of S2 students to 77.3% of S4 students and 63.2% of S6 students), siblings and relatives (all around 70%). A reasonable level of satisfaction was reported. One teacher mentioned in the focus group interview that software is very expensive and that EMB should have coordinated the development of teaching software and materials to be shared by all schools.

One more perspective on support was obtained from the parents' questionnaire, which suggested that around half of the parents were willing or very willing to provide resources including time and money to support their children's learning with IT (Parents' Questionnaire item 10).

7.3.7 Needs and obstacles

The school heads' questionnaire data (Table 7.26, School Heads' Questionnaire item 19) suggest that the greatest support need in secondary schools is for computers and infrastructure and software, thus implying that resourcing is still perceived by heads as one of the main concerns, above staff development (81.7% rating increasing/upgrading of computers, 81.4% rating increasing/upgrading of peripherals and 88.9% rating increasing/upgrading of software as being quite or much in need). There are still around 77% of school heads who see quite/much need for supporting teaching-related issues such as integrating IT into the school curriculum (77.1%), using IT in teaching/assisting teaching (76.1%), and around 60% who rated enhancing the IT skills of teachers (59.6%) and students (57%) or using IT to support students with individual needs (63%). Relatively little priority was given to supporting developments that would lead to greater collaboration between schools, with the lowest ratings given to sharing experiences with teachers (45%) and students (29.7%) from other schools.

Table 7.26: Heads' ratings of support needs in schools (School Heads' Questionnaire, Q. 19)

Needs	Mean (0-4)	SD	N	% of heads choosing the option				
				Much in need	Quite in need	Average	Not much need	No need at all
Integrating IT into the school curriculum	2.9	0.8	371	21.0	56.1	18.1	4.3	0.5
Using IT in teaching/assisting teaching	2.9	0.8	372	17.5	58.6	19.4	4.0	0.5
Enhancing the IT skills of students	2.6	0.9	372	14.8	42.2	30.1	11.6	1.3
Enhancing the IT skills of teachers	2.7	0.9	371	16.2	43.4	32.4	7.6	0.5
Sharing experiences with teachers from other schools	2.4	0.8	371	5.9	39.1	45.6	8.6	0.8
Sharing experiences with students from other schools	2.1	0.8	371	3.0	26.7	45.0	23.5	1.9
Using IT for performing/supporting school administration/management tasks	2.7	0.9	370	17.8	45.1	24.9	10.8	1.4
Increasing the number of/upgrading computers	3.2	0.8	371	42.3	39.4	14.3	3.8	0.3
Increasing the amount of/upgrading computer peripherals	3.2	0.9	371	40.2	41.2	13.2	5.1	0.3
Increasing the number of network nodes in school	2.6	1.0	370	22.7	34.9	27.0	13.2	2.2
Increasing the amount of/upgrading educational software and IT teaching resources	3.3	0.7	370	44.3	44.6	10.0	1.1	0.0
Using IT to support students with learning difficulties	2.7	0.9	370	16.0	47.0	26.8	9.2	1.1
Using IT to provide additional materials to supplement the curriculum for gifted students	2.6	0.9	369	16.0	45.8	26.8	9.8	1.6

One teacher mentioned in the focus group interview that:

> *EMB provided sufficient hardware when ITEd was first implemented, but they did not take long-term maintenance into consideration. Over five or six years the hardware becomes outdated and should be replaced. The IT coordinator position cannot be cut as we need him to help teachers in preparing materials. Should we want teachers to apply IT actively in teaching, we need to hire a few Technical Assistants.*

In another focus group interview with teachers, they recommended that:

> *There should be a clear policy towards the maintenance and repairs of the computer equipment. The cost for sustaining the project is high as the obsolescence problem of the devices is serious. It is expected to consume a huge amount of funds.*

From the perspective of the IT team members (Table 7.27, IT Team Members' Questionnaire item 5) the pattern is similar to that of the school heads. The highest percentage rated increasing/upgrading software as quite/much in need (82.5%), followed by increasing/upgrading peripherals (75.3%) and increasing/upgrading computers (74.6%). Again the lowest percentages saw sharing experiences with teachers (38.7%) and students (26.7%) from other schools as being important needs.

Table 7.27: IT team members' ratings of support needs in schools (IT team members' Questionnaire, Q. 5)

Needs	Mean (0-4)	SE	N	% of IT team members choosing the option				
				Much in need	Quite in need	Average	Not much need	No need at all
Integrating IT into the school curriculum	2.7	0.03	655	12.8	51.1	30.0	6.2	0.0
Using IT in teaching/assisting teaching	2.7	0.03	656	12.6	53.1	27.5	6.4	0.4
Enhancing the IT skills of students	2.6	0.03	657	14.4	47.2	28.0	8.7	1.7
Enhancing the IT skills of teachers	2.8	0.03	657	17.6	49.7	26.8	5.1	0.8
Sharing experiences with teachers from other schools	2.2	0.03	657	5.6	33.1	43.0	17.5	0.9
Sharing experiences with students from other schools	2.0	0.03	656	4.7	22.0	43.5	27.4	2.5
Using IT for performing/supporting school administration/management tasks	2.7	0.03	656	15.9	47.3	27.2	8.7	0.9
Increasing the number of/upgrading computers	3.0	0.04	657	34.6	40.0	19.8	5.0	0.6
Increasing the amount of/upgrading computer peripherals	3.0	0.03	654	33.0	42.3	19.8	4.2	0.6
Increasing the number of network nodes in school	2.5	0.03	656	18.3	35.9	27.0	16.7	2.1
Increasing the amount of/upgrading educational software and IT teaching resources	3.1	0.02	657	34.3	48.2	14.4	3.0	0.1
Using IT to support students with learning difficulties	2.5	0.03	655	11.4	39.6	37.9	10.5	0.6
Using IT to provide additional materials to supplement the curriculum for gifted students	2.5	0.03	656	11.0	40.0	35.4	12.4	1.1

As already mentioned in Chapter 6, the focus group interviews with some of the stakeholder groups pointed out that the issue of obstacles to effective pedagogical use of IT is a complex one that incorporates location of computers in special rooms instead of general classrooms and the notion that 'more is better' in terms of quantities of hardware and software as well as the need to put more resources into developing the teaching and learning. Added to this is the issue raised in stakeholders' groups interviews, also mentioned previously in Chapter 6, that even the layouts of some computer labs are not conducive to good pedagogical practice.

When students were asked about the kinds of assistance they want when using IT for learning (Students' Questionnaire item 29) the most frequently indicated by S2 students was offers by commercial organisations of special rates for students' purchase of computers (43.1%) followed by computer technical support from school after school hours (38.2%) and extension of opening hours of school computer facilities after school (34.8%). Only 23.4% of S2 students chose extension of operation hours of computer facilities at public libraries/community centres/youth centres. The S4 students' responses indicated the same three priorities (53.4%, 31.4% and 28.9% respectively), with only 19.2% indicating that they would like extension of operation hours of computer facilities at public libraries/community centres/youth centres. Again the S6 students repeated the same three items as their priority (65.6%, 30.8% and 30.3% respectively) with 23% selecting extension of operation hours of computer facilities at public libraries/community centres/youth centres. It is interesting to note the increase from S2 to S6 in the percentages of students wanting offers of special rates to purchase computers. There was also some increase (from 20.3% to 34.6%) in percentages of students wanting provision of IT courses or training by schools/other organisations.

7.4 School and wider community culture

This section considers various aspects of the secondary school IT culture and that of the wider community. The first of these is the beliefs and visions of the secondary school heads and IT leaders within schools and the ways in which they are reflected in schools' IT plans. Factors taken into account in implementing IT in the school and the actual roles of the school's leaders can also have an impact upon the school's IT culture, hence these factors are examined along with the interactions between schools and wider community groups in establishing the IT culture. The next section describes the activities that schools have organised to promote an IT culture within the school and the wider community, and the final sections examine the extent and nature of the impact of IT on the school and community cultures and factors that can affect them.

7.4.1 School leaders' beliefs and visions

It is an encouraging sign of the emerging IT culture in secondary schools that 90.7% of the school heads surveyed said their schools have developed ITEd plans (School Heads' Questionnaire item 14c). From School IT Survey Item 1h, 96% said that their school IT plan or policy focuses on teacher training/development followed by teaching (93.1%), and then administration (83.1%) with extra-curricular activities being less common (59.8%). The most common goals for IT plans (Table 7.28, School Heads' Questionnaire item 5) are concerned with making the learning process more interesting (92.9%), improving students' learning outcomes (89.2%), strengthening students' initiative, independence and sense of responsibility in learning (81.7%). The least common are strengthening or developing co-operation among students (55.3%) and satisfying the expectations of parents and community (50.5%). These patterns parallel those of the Preliminary Study, although the school heads surveyed in this Study do not seem to have placed the same emphasis on catering for individual students' needs as was reported in the Preliminary Study. Interestingly, however, only slightly more than half of the respondents indicated that the goal of strengthening co-operation among students is important, even though this is an important component of the kind of student-centred learning that can bring about the other goals they did stress as important. Similarly, only 60.4% think that using IT to improve collaboration between different subjects to enable curriculum integration, or to use it as a way to bring about closer communication and co-operation within the school and between the school and community are important goals.

Table 7.28: Heads' perceptions of importance of goals in formulating School IT plan (School Heads' Questionnaire, Q. 5)

Goals	Mean (0-4)	SD	N	% of heads choosing the option				
				Very important	Quite important	Average	Not very important	Not important at all
a.	3.3	0.7	370	41.9	47.3	10.3	0.5	0.0
b.	3.3	0.6	370	37.8	55.1	6.8	0.3	0.0
c.	3.1	0.8	371	29.1	52.6	15.1	3.0	0.3
d.	2.9	0.8	371	18.9	54.5	22.4	4.0	0.3
e.	2.6	0.8	371	12.4	42.9	37.5	6.5	0.8
f.	2.9	0.8	371	18.6	54.7	22.6	3.5	0.5
g.	2.8	0.8	371	18.1	48.0	27.0	6.5	0.5
h.	2.7	0.8	371	11.9	48.5	33.2	5.9	0.5
i.	2.6	0.8	371	12.4	46.9	32.4	8.1	0.3
j.	2.5	0.9	370	8.9	41.6	37.6	10.0	1.9

a. To improve students' learning outcomes
b. To make the learning process more interesting
c. To strengthen students' initiative, independence and sense of responsibility in learning
d. To strengthen/develop students' analytical power/creativity
e. To strengthen/develop co-operation among students
f. To provide suitable learning activities according to individual needs
g. To provide training to prepare students for further study or future careers
h. To improve collaboration between different subjects and integrate the curriculum
i. To improve communication and co-operation among your school, parents and the community
j. To satisfy the expectations of parents and the community

7.4.2 Implementation of the school IT plan

More than 95% of the secondary school heads indicated that they have adopted security measures and practices to prevent student exposure to unsafe or unhealthy information in implementing their school IT plans (School Heads' Questionnaire item 17). 98.1% indicated that they encourage teachers to enroll for courses or participate in training in ITEd, although it is not clear from these data whether the training refers to skill training rather than training in the pedagogical use of IT. Only 77.4% indicated that they have defined learning targets for the implementation of the IT plan. Not many (14.3%) showed that they have used the school's IT facilities to promote a community culture of IT use, by either allowing students to use school computers appropriately for non-study purposes or allowing public access to the IT facilities in the school. About 94.3% of school heads said that they have used IT in school administration and management and 79.6% for researching or analysing school data. 69.3% had used it for inter-school communication and joint activities, but only slightly more than half have used it for communication with teachers and less than half reported that they have used it for communication with students or parents, and only 45.7% indicated that they have used it for teaching (School Heads' Questionnaire item 2).

It was mentioned earlier that 99.7% of the secondary schools surveyed have school websites. There is some evidence that these are used within the school since 96.3%-98.2% of the students from those schools with websites said they knew about this. The main use within the school community was for communicating announcements. However as a means of communicating with the wider parent community the use is not so widespread. For example, as will be discussed in more detail in Section 7.4.5, only about one-quarter of the parents surveyed said they had actually looked at their sons' or daughters' school webpages.

In addition, 96.9% of the respondents (School Heads' Questionnaire items 8 and 8a) said that their schools have intranet and more than 89% agreed or strongly agreed that the purposes for developing the intranet were to improve communication within the school, improve teaching effectiveness and to encourage students' initiative, establish the culture of sharing and to improve school administration/ management. On School Heads' Questionnaire item 8b the percentages of school heads indicating that they use the school intranet for a range of purposes were high: the highest being for storing teaching, training and learning materials (96.9%) and the lowest functioning as a communication platform for school and parents (62.1%). The school heads also gave high ratings for the usefulness/effectiveness of the school intranet for these purposes, with more than 70% giving ratings of effective/very effective for all items except releasing school news to parents (67.5%), releasing news/information about student associations or clubs to teachers, students and parents (69.1%) and functioning as a communication platform for students and teachers (69.6%) and for school and parents (48.5%).

7.4.3 Leadership roles

The average number of IT Team members per school is 2.9 and the average permanent and non-permanent teachers to IT Team members ratio is 8.9 to 1 (School Heads' Questionnaire item 14a). In 54.8%-58.1% of the cases the responsibility for overseeing all ITEd related activities in the school falls to the IT coordinator and the IT team (School Heads' Questionnaire item 14b). Also, 97% of the heads reported that their IT team participated in formulating the school IT plan (School Heads' Questionnaire item 14d). The instances of community members from outside the school participating in the formation or implementation of school IT plans are extremely low (2% or less). 97% of the school heads agreed or strongly agreed that their role is to allocate IT resources properly and 94.6% or more agreed or strongly agreed that their own role is to set clear objectives and guidelines, encourage and motivate teachers to make appropriate use of IT in teaching, provide sufficient training and professional development and support to teachers, and to integrate IT into the school-based curriculum. 84.8% agreed or strongly agreed that their role is to promote online learning (School Heads' Questionnaire item 9a). This is consistent with the findings of the Preliminary Study. Fewer secondary school heads said they see it as their role to promote online communication within the school (76.2%, although this is still a reasonably high proportion), and lower again are roles beyond the immediate school community such as making the school an exemplary model (61.2%) and sharing of experiences with others outside the school community (51.1%). The IT team members' self-perceptions of their roles (IT Team Members' Questionnaire item 3) follow similar patterns to the school heads, although the percentages are slightly lower. 91% or more of the IT team members expressed strong opinions about their role in encouraging, supporting and organizing professional development for teachers and more than 79% rated various aspects of participating in the formulation and implementation of the school's IT policy.

7.4.4 Activities to promote IT culture

There is a wide range of activities described in the EMB Documents that have been designed to encourage students to use IT in various subject areas, to develop higher order thinking skills and to understand society better and become better citizens. From the EMB Document analysis it was revealed that in a survey of 277 secondary and 487 primary and special schools, most schools indicated that they were willing to work with PTAs and local communities or NGOs to provide facilities for parents but not to the public due to concerns about human resources, security and maintenance. It was reported in the EMB Documents that in the 1999-2000 school year some 1000 schools had utilised the incentive grant to open up their computer facilities after normal school hours (in 2001-02 this was $14 665 for an aided school and 208 hours of overtime work at Workman II level for a government school).

98.9% of the surveyed secondary schools indicated that they had done at least one of the listed activities (School Survey, item 4b) to promote IT culture during the two years prior to data collection. 95% of the surveyed schools had organised IT-related extra curricular activities for students, 72.8% had organised IT courses for parents and 73% had organised IT competitions. Other than that, very few activities organised by the school were reported.

The School IT Survey data appear to be understated when compared with the School Heads' Questionnaire. When asked to show the activities in which the school had engaged in the year prior to data collection (Table 7.29, School Heads' Questionnaire item 10), 98.1% of the school heads made a strong claim for encouraging students to make use of IT in their daily lives. More than 73% indicated that they occasionally/always encourage IT culture within the school community of staff and parents to some extent through providing IT courses for parents (73.1%) and holding experience-sharing staff meetings (79.1%). There is some suggestion of participation in community activities such as participating in public exhibitions of competitions on IT or ITEd (68.7%) and holding or participating in experience-sharing meetings with other schools (64.9%). Apart from these, only about one-third or less indicated that their schools have participated in activities that will engage the community beyond the school and parents.

Table 7.29: Frequency of engagement in activities to promote IT culture in the past year reported by school heads (School Heads' Questionnaire, Q. 10)

Activities	% of school heads choosing the option				N
	Always	Occasionally	Rarely	Never	
Encouraged students to make use of IT in their daily lives	67.1	31.0	1.9	0.0	368
Provided IT courses to parents	11.1	62.0	18.2	8.7	368
Provided IT courses to the community	2.5	14.7	31.3	51.5	367
Made school IT facilities accessible to parents/public	3.0	26.2	24.8	46.1	367
Provided IT support to parents/the community	2.5	31.8	31.5	34.2	368
Co-operated with other schools through computer networks	1.4	36.2	35.4	27.0	367
Held public exhibitions or competitions on IT/IT in Education	2.7	21.3	27.6	48.4	366
Participated in public exhibitions or competitions on IT/IT in Education	13.4	55.3	19.6	11.7	367
Held experience sharing meetings for school staff	16.6	62.5	17.9	3.0	368
Held/participated in experience sharing meetings with other schools	8.5	56.4	26.4	8.7	367

When making comparisons to corresponding questions in the Preliminary Study it is encouraging to see that there has been quite an increase in the percentage of school heads who indicated they had made at least some attempt to organise activities for parents and the community. The number of schools providing IT courses to parents has risen from 77.4% to 91.3% and the number providing IT courses to other people in the community has risen from 18.2% to 48.5% of respondents. Similarly an increase from 26.4% to 65.8% of schools reported that they had provided IT support to people other than teachers and students, such as parents and the general community. 73% of responding schools said they had co-operated with other schools through computer networks, compared to 40.7% who claimed in the Preliminary Study to have done this, and 51.6% said they had held public exhibitions of competitions on IT or ITEd, compared to the figure of 24.5% reported in the Preliminary Study. In the School Visits and interviews there were no examples cited of schools opening their facilities to the wider community – although there was a sense that it would be good to have community sharing.

7.4.5 Contributing parties to community-wide IT culture

On School Heads' Questionnaire item 11, the principals were asked to indicate organisations with whom they had collaborated over the past year in organising/promoting activities in ITEd such as seminars, workshops and meetings. 31.8% said they had at least occasionally consulted local schools and 26.7% each of EMB and local community or commercial organisations. Very few had contacted local tertiary institutions, institutions in Mainland China or institutions overseas. Generally there is still some room for improvement, therefore, for secondary schools to tap into a wide range of organisations that can help to enhance the quality of ITEd.

It appears that the surveyed secondary school heads are of the opinion that it is the education-related institutions followed by the commercial organisations that enable the community to get in touch with IT (School Heads' Questionnaire item 12). 83.5% of the school heads think that the EMB is making a considerable or great contribution to promoting a community-wide culture using IT. Around 70% think that local schools and Internet service providers are making a considerable or great contribution while 67.2% and 63.7% said the same of software/hardware service providers and IT application system developers respectively. In other words, the highest ratings were given to those who provide the services and resources. After this, 62% acknowledged the contribution of tertiary institutions, but only 45.5% thought that contributions were being made by commerce and industry and only about one-third thought contributions were being made by professional education organisations.

With regard to the parties from whom the school sought support to plan, install or deploy IT resources (School Heads' Questionnaire item 15 and IT Team Members' Questionnaire item 1), the most common, reported to be used by 95% or more of respondents were IT team members and school administrators. 95% of school heads and 84.3% of IT team members reported consulting other teachers. 97% of the school heads and 86.3% of IT team members rated the input of the IT team members as being quite or very useful and 86.3% of school heads/70.9% of IT Team members rated the input of school administrators such as the vice-principal as quite or very useful. The input of other teachers was rated quite or very useful by 74% of school heads/56% of IT team members who responded to this question. 42.6% of school heads/32.4% of IT team members reported having consulted staff from EMB or the former ED and 73.3%/60.2% reported having consulted board of school directors/school management committee members. There were very few reported incidents of schools seeking input from either students (37.3% of school heads/27.7% of IT team members) or parents (25% of school heads/16.4% of IT team members) for IT planning.

As mentioned in the Primary Sector Report in Chapter 6 this pattern of little support seeking from the general community is echoed by the interviews with Trade Association representatives. They indicated that they are willing to support ITEd through various forms of collaboration but that, as yet, they have not been invited by the Government or schools to do so.

To explore further the contribution of community resources, some of the student data presented in more detail in other sections warrants some discussion here. First, it is relevant to consider the extent to which HKedCity has contributed to the IT community culture. In 2002 it was reported by the Director of Education at the Hong Kong Digital Day Carnival that more than 3.7 million people had visited HKedCity, again indicating that it has a high potential impact. As reported in relation to Research Question Set 3, 63% of the secondary school teachers surveyed reported to have used this and 56.2% of those who had used it said they were satisfied or very satisfied with it. Students, on the other hand, did not indicate as high a use of HKedCity. Around 40% of S2 and S4, and 44.6% of S6 said they had used it, although more than 74% of those who have used it reported it as being average or quite useful. It appears, therefore, that there is further room to develop the potential of HKedCity with the secondary school community to promote an IT community culture.

The second area that can shed further light upon the community IT culture is the locations where students use computers outside their schools and homes, discussed in relation to Research Question Set 1 (see Section 7.1.3). Less than 5% of secondary students use community centres or youth centres and less than 23% (between 10.3% and 22.5%) use cyber cafes. Libraries are more popular locations with secondary students (between 19% and 26.4%). However, all of these community locations are used less frequently for IT than other people's homes (between 36.4% and 42.7%).

7.4.6 Impact on school administration and communication

More than 87% of the school heads agreed or strongly agreed that ITEd has had an impact on school administration or management with respect to improved communication within and outside the school, improved management of student and teacher records and improved management of teaching and learning resources (School Heads' Questionnaire item 9e).

However, when we look at parent involvement, we can see that their use of IT to communicate with the school community is low. Only around 6% of the secondary school parents surveyed (Parents' Questionnaire item 7) said they have participated in IT or computer courses or seminars organised by their children's schools. Of the 93.3% to 95.6% of parents who said they had not participated, 8.4% of S2, 8.2% of S4 and 16.9% of S6 parents said this was because the school had not organised any such courses. 19.2% of S2, 22.3% of S4 and 27.3% of S6 claimed they did not know if any courses had been offered. More than half of the non-participants gave lack of time as the reason, around one-third saying that they are not interested. 69.6% of S2, 73.9% of S4 and 85.6% of S6 parents said they have not browsed the homepages of their children's schools (Parents' Questionnaire item 5). Again lack of time was given as one of the major reasons for not doing so (between 24.2% and 33.7%), the other being lack of knowledge about the necessary IT skills (between 43% and 43.8%). Around 97% of parents have never communicated with their children's schools through email (Parents' Questionnaire item 6), with 42% to 52.1% citing lack of the necessary skills, 32.8% to 42.7% citing lack of need to do so and 28.4% to 30.9% citing lack of time. Only between 8.7% and 13.4% of responding parents said they have not communicated because the school does not have any IT communication channels (Parents' Questionnaire item 6_1).

Nevertheless, the potential exists to develop the use of IT as a means of communication. Between 72.3% to 77% of the parents who have browsed the schools' homepages believe it has enhanced their knowledge about the school (Parents' Questionnaire item 5a) and 78.7% of S2, 69.5% of S4 and 70.3% of S6 parents of those who have used email to communicate with the school have found the outcomes to be quite or very satisfactory (Parents' Questionnaire item 6_2). Hence, as with the primary school data, there is a fairly strong suggestion from these secondary school data that IT can potentially improve home-school communications for those parents who have the time and the skills to utilise it.

7.4.7 Factors affecting IT culture

School policy and planning

More than 93% of the secondary school heads and IT team members indicated that they have taken into account a full range of factors when planning, installing and deploying IT resources: school financial situation and teaching effectiveness were all rated as quite or very important. More than 90% of the school heads and more than 80% of the IT team members' gave the same rating to environment, allocation of manpower, and teachers', students' and curriculum needs (School Heads' Questionnaire item 16 and IT Team Members' Questionnaire item 2). 76% of the school heads and 66.7% of the IT team members rated EMB policy as quite or very important.

Parents' attitudes and beliefs

51.5% to 64.3% of the responding parents said they would welcome the use of IT and computers in teaching in their teenagers' schools quite or very much, with another 31.1% to 41.4% saying they would welcome it slightly (Parents' Questionnaire item 8). Comparatively speaking secondary school parents seem not to be so confident that IT can improve their children's interest in learning (between 52.6% and 65%) – they are more interested in the fact that the application of IT is becoming increasingly popular in daily lives (between 83.4% and 87.4%) and the ways in which it can impact upon their futures (around 77%). 71.5% to 79.1% of the parents said they agree or strongly agree that ITEd can help to strengthen students' ability to use IT and 66.5% to 72.2% said they agree or strongly agree that it can help to strengthen students' confidence to use it (Parents' Questionnaire item 9).

7.5 Student learning

This section begins with a general overview of the extent to which secondary school students like their teachers to use computers in class. This is followed by an examination of the ways in which students use computers generally, and specifically at home or at school, and the strategies used by their teachers to encourage them to make use of IT outside school hours. The next section considers students' self-perceptions of their competence and confidence to use different aspects of IT. This followed by a description of the outcomes of the IT Literacy Assessment (ITLA). A brief section considers students' attitudes toward using IT as measured by their participation in a range of appropriate and inappropriate computer-related behaviours, and the final section explores school heads', teachers' students' and parents' perceptions of the impact of IT use on cognitive and affective aspects of the students' learning.

7.5.1 General attitudes towards teachers' use of IT for teaching

When the secondary school students were asked to indicate the extent to which they liked their teachers using computers in class (Students' Questionnaire item 9), 62.8% of S2, 54.3% of S4 and 42.4% of S6 students indicated they liked their teachers to use it quite or very much. This shows a decreasing trend in the liking of IT use in the senior forms.

This observation was supported by the student focus group interview data. Most of the students in the junior form (S2) said that they like their teachers to use IT, but students in the senior forms (S4, S6) were more neutral about this. However, it was evident that they do not like it irrespective of how it is used, and they expressed some quite definite ideas about what they prefer. The S2 students said that they would prefer their teachers to use more IT such as movies, video clips, web resource, animation and simulation (i.e. media content) in the lessons. In the teacher focus group interviews this point was also mentioned, with teachers saying that, because students are accustomed to the visual stimulation and excitement of games, they are not so attracted by a simple computerised presentation. In fact, as the students' comments are already beginning to suggest, it is probable that this kind of novelty effect may wear off as IT becomes more and more commonly used for this purpose.

The S4 and S6 students said they thought their teachers were making suitable and appropriate use of IT but that it should not limited to the current format and frequency of use. The students across all grade levels said that they dislike frequent use of PowerPoint if it is used as a replacement for the blackboard or whiteboard. They all – especially the S6 students – said they are tired with boring PowerPoint presentations, but they did mention that a beneficial aspect is that the PowerPoint presentation can be downloaded and printed for self-study. Students in both S4 and S6 said that the content of the presentation is more important than the medium through which it is presented, but that they would welcome any interesting means of conducting a lesson. During the student interview, some students of upper forms commented that their prime concern is how effective is the IT used, not the frequency of use.

7.5.2 Students' reported use of IT

Table 7.30: Nature of IT use reported by student (Students' Questionnaire, Q. 23)

Nature of use	S2					S4				
	% of students choosing the option				N	% of students choosing the option				N
	Always	Occasionally	Rarely	Never		Always	Occasionally	Rarely	Never	
Communicating with others	60.9	25.4	7.2	6.5	2066	66.4	23.9	6.6	3.1	2021
Collaborating with others	18.9	49.5	24.6	7.0	2063	14.1	48.9	30.4	6.7	2020
Self-learning	9.5	31.1	44.7	14.8	2063	7.3	30.9	45.3	16.5	2018
Tackling practical problems in daily life	15.4	34.3	32.0	18.3	2057	20.1	41.9	25.9	12.1	2019
Doing creative work	13.7	32.7	37.4	16.2	2044	11.6	29.1	41.7	17.6	2014

Nature of use	S6				
	% of students choosing the option				N
	Always	Occasionally	Rarely	Never	
Communicating with other	71.2	21.9	5.3	1.7	1836
Collaborating with others	19.9	50.5	25.3	4.4	1837
Self-learning	7.8	36.0	45.2	11.0	1835
Tackling practical problems in daily life	30.3	46.4	18.0	5.4	1836
Doing creative work	9.0	30.5	42.2	18.3	1834

From Table 7.30 (Students' Questionnaire item 23) it can be seen that, in general, the most common use of IT by all students is for communication with others (86.3%, 90.3% and 93.1% of S2, S4 and S6 respectively saying they do this occasionally or always). For S2 students the next most common use is in collaborating with others such as in group projects (68.4% rating occasionally/always) followed by tackling practical problems in daily life (49.7%). For S4 and S6 students tackling problems in daily life was rated occasionally/always by 62% and 76.7% respectively and collaborating with others by 63% and 70.4% respectively. 46.4% of S2, 40.7% of S4, and 39.5% of S6 said they occasionally or always engage in doing creative work.

When students were asked about their usage in school, the data suggest that there is very little opportunity for secondary school students to use computers in class, other than in specific computer lessons. When computer lessons were excluded (Students' Questionnaire item 8), 45.9% of S2, 67.9% of S4 and 61.3% of S6 students said they do not have any chance to use computers in class at all. Only 13% of S2, 9% of S4 and 8.5% of S6 reported that they had a chance to use IT more than 2-3 times per week, while 41% of S2 students, 23.1% of S4 students and 30.3% of S6 students reported that they used computers in class once a week or less. These figures reflect an improvement in the proportions reporting in the Preliminary Study that they had used computers in class. There is a trend here that the higher the form level, the less the students seem to have opportunities to use computers at school. A similar trend is evident in the students' reported use at home (Students' Questionnaire item 1b). 34.9% of the S2 and 30.7% of the S4 students said they used home computers, on average, for less than two hours per day whereas 42.9% of the S6 students said they spent less than two hours per day. Also the S6 group is the one with the smallest proportion spending longer periods of time using their home computers, for example 36.4% indicating more than three hours' use per day, compared to 50.7% of the S4 students and 45% of S2.

On Students' Questionnaire item 4, 53.4% of S2 students, 45.5% of S4 students and 56.9% of S6 students reported that, at school, they usually use computers to search for information on the Internet and 31.8%, 21.4% and 24.3% for S2, S4 and S6 respectively reported that they usually use IT for project work. 20.6% and 15% each of S2 and S4 students said they usually use computers in school for learning computer skills, but this dropped to 10.8% of S6 students. On the other hand, there is a slight increase from S2 and S4 (13.7% and 12.7%) to S6 (18.7%) in the proportions using computers for presentations. Nevertheless, the frequency of reports of these uses is quite low.

Table 7.31: Teacher encouragement for students to use IT in learning activities (Teachers' Questionnaire, Q.10)

Activities	**% of teachers choosing the option**				**N**
	Always	**Occasionally**	**Rarely**	**Never**	
Reading announcements or searching for information released by the school/clubs on the school website	22.7	49.8	20.8	6.7	6292
Downloading learning materials	19.8	46.5	24.5	9.2	6295
Uploading homework/assignments	9.3	32.2	35.8	22.7	6268
Participating in online tests/examinations	5.6	25.8	36.7	31.9	6261
Checking grades and feedback on assignments from teachers	4.0	20.4	35.5	40.1	6241
Participating in forums/discussion groups	6.9	26.9	36.7	29.5	6238
Communicating with others	13.4	35.6	32.7	18.4	6257
Working collaboratively with others	13.5	42.9	27.7	15.9	6256
Self-learning	20.2	46.0	23.0	10.9	6254
Tackling problems in daily life	15.8	41.6	27.6	15.0	6261
Performing creative tasks	13.9	41.8	28.1	16.2	6265

Table 7.31 (Teachers' Questionnaire item 10) shows the IT activities that teachers reported having encouraged or requested their students to use in relation to teaching and learning. The most frequently reported activities were reading announcements or searching for information released by the school/clubs on the school website (72.5% of teachers indicating that they do this occasionally or always), downloading learning materials (66.3%) and self-learning (66.2%). More than half the teachers reported encouraging or requesting their students to use IT for tackling problems in daily life (57.4% indicating that they do this occasionally or always), working collaboratively with others (56.4%) and performing creative tasks (55.7%). The least popular activities reported were participating in online tests and examinations (68.6% of teachers reporting they rarely or never asked their students to do this), checking grades and feedback on assignments (75.6%) and participating in forums or discussion groups (66.2%).

Students' reports of the purposes for which their teachers encourage them to use computers outside class (Students' Questionnaire item 12) indicate that learning new knowledge is a high priority for all grade levels (81.8% of S2, 82.3% of S4 and 88.1% of S6). Computer use for homework is encouraged by 64.7%, 63.2% and 69.9% respectively of the S2, S4 and S6 students' teachers. Encouragement to do extra-curricular activities is moderate for S6 students (43.1%) but lower for S4 students (37.5%) and S2 students (38%), and 39% or less (38% of S2, 39% of S4 and 37.1% of S6) of each grade level indicated that their teachers encourage them to use computers to communicate with friends or classmates outside class. These patterns appear to be similar to those reported in the Preliminary Study.

Around 80% (82.9% of S2, 83.7% of S4 and 79.7% of S6) of all secondary student respondents indicated that they had submitted their homework by floppy disk and around 60% (60.9% of S2, 61.4% of S4 and 59.9% of S6) that they had submitted homework via email (Students' Questionnaire item 11). 54.5% of the S2 and 51.7% of S4 students but only 38.8% of the S6 students said they had submitted homework via the school intranet. It is encouraging that students are using IT at least to some extent for doing homework – whether it is in computer subjects or other curriculum areas is not indicated by these data, however.

Students' Questionnaire item 24 attempted to get some insights into students' roles in the use of IT. 73.6% of S2 students, 71% of S4 and 68.6% of S6 had occasionally or always engaged in self-learning of new computer skills/knowledge, 60.9% of S2 students, 60.3% of S4 and 57.5% of S6 had occasionally/always recommended useful websites/software/hardware to classmates/friends. 58.3% of S2 students, 56.9% of S4 and 55.8% of S6 had engaged in teaching others and 65.2% of S2 students, 58.8% of S4 and 59.2% of S6 in helping others.

7.5.3 Students' pedagogical use of IT

Table 7.32 shows the average time spent by students per week on various activities as reported in the IT Activity Daily Log.

Table 7.32: Average time spent in minutes per week and mean rating on each activity

Activity type	S2 (Valid cases = 81)				S4 (Valid cases = 85)			
	Time spent (min)	Importance (1–5)	Performance (1–5)	Liking (1–5)	Time spent (min)	Importance (1–5)	Performance (1–5)	Liking (1–5)
Classroom activity	56.0	3.7	3.5	3.5	79.8	3.8	3.5	3.5
School works activity	93.1	4.2	4.0	2.7	50.6	3.9	3.5	3.4
Self-learning/studying	51.4	3.6	4.0	3.6	25.2	3.6	3.3	3.3
Communication	84.2	3.1	3.7	4.1	154.6	3.1	3.9	4.0
Browsing Internet	109.2	3.0	3.5	3.9	213.6	3.0	3.9	4.2
Listening Music	53.6	3.1	3.9	4.3	165.5	2.8	4.0	4.3
Watching Movie	18.3	2.7	3.7	4.0	30.2	3.5	3.8	4.2
Entertainment games	235.3	2.7	3.9	4.4	367.4	2.7	4.0	4.5
Learning-related games	7.1	3.2	3.7	3.7	6.4	2.8	4.4	4.2

Activity type	S6 (Valid cases = 85)			
	Time spent (min)	Importance (1–5)	Performance (1–5)	Liking (1–5)
Classroom activity	142.2	4.0	3.2	3.5
School works activity	97.9	3.9	3.5	3.1
Self-learning/studying	34.2	4.0	3.4	3.2
Communication	188.8	3.0	3.9	3.7
Browsing Internet	140.4	2.9	3.7	3.8
Listening Music	95.1	3.3	3.9	4.3
Watching Movie	20.9	2.7	3.7	4.0
Entertainment games	121.0	2.7	3.9	4.4
Learning-related games	2.2	3.2	3.7	3.7

When the IT Activity Daily Log was examined some interesting similarities and differences in students' IT usage patterns emerged.

For S2 students the main uses were, in the order of the amount of time spent on them, entertainment, web browsing, learning-related tasks and communication. The pattern was similar for S4 students. The S6 students also indicated a similar pattern, except that they spent less time on entertainment and games (121 minutes) and more time on learning-related tasks.

The main software used by S2 students was ICQ, games and web browser. The S4 indicated the same, except that there was an emergence of more time spent using audio-visual software, which suggests more listening to music, videos etc. Again the S6 students reported that they spent most of their time using ICQ, web browser and games, but there was also an increase in the proportion using word processing, presentation and spreadsheet software. This latter is a reflection of what was mentioned above, that the S6 students spent more time on learning-related tasks.

When S2 students were asked to rate their liking for or perception of the importance of the activities they had engaged in, the highest importance was given to school-based activity but their liking was average. The only exception to this was self learning, for which the mean rating was high. Conversely, the mean ratings for importance of entertainment activities and learning-related games were average but for liking of these activities the means were high. The patterns reported by S4 and S6 students' perceptions of importance and liking were very similar to the S2 pattern.

When we group the activities into the categories of learning, communication and information searching, and leisure and entertainment, some interesting, if not surprising, patterns can be seen. For S2 and S4 students the largest amount of time was spent on leisure and entertainment activities (averages of 307.2 and 563.1 minutes per week respectively, which accounts for 43.4% and 51.5% respectively of the time they spent using computers), followed by communication and information seeking (193.4 minutes, or 27.3% of the time spent using computers, and 368.2 minutes, or 33.7% of their time). Even including the time spent on classroom activity, learning-related activities only account for an average of 207.6 minutes (29.3% of the total time spent using computers) for S2 students and 162 minutes (14.8% of total time) for S4 students. The pattern for S6 students is somewhat different, however. They spent the highest average amount of time (329.2 minutes, or 39.1% of total time) engaged in communication and information seeking, followed by 276.5 minutes (32.8% of total time) on learning-related activities and 237 minutes (28.1% of total time) on leisure and entertainment.

Most of the activities reported by the students across the three grade levels were done at home. From the student focus group, some students reported that they sometimes go the cyber café to play on-line games.

7.5.4 Students' self-ratings of IT competence

The first area in which students were asked to self-rate was their personal confidence with using IT (Table 7.33, Students' Questionnaire item 30). Most students indicated that they felt at least reasonably confident in using computers for their own purposes. Only 9.3% of S2, 10.7% of S4 and 11.9% of S6 students said they felt not quite confident or not confident at all. This adds further support to the observation that computer use has become a part of life for all school students. Interestingly, there is a decrease in the percentage of students who rated themselves as quite or very confident (58.2% of S2 students and 47.5% of S4 and 47.7% of S6 students).

Table 7.33: Students' self-rating of confidence with using IT (Students' Questionnaire, Q. 30)

Confident level	S2 (N= 2015)	S4 (N= 2002)	S6 (N= 1816)
	%	%	%
Very confident	16.3	10.3	8.8
Quite confident	41.9	37.2	38.9
Average	32.5	41.8	40.5
Not quite confident	7.3	8.9	9.8
Not confident at all	2.0	1.8	2.1
Total	100	100	100

When asked about their self-rating of proficiency in hardware use (Table 7.34, Students' Questionnaire item 21), 83% or more of all students said they are basically or highly proficient in using printers and 52% or more rated themselves as basically or highly proficient in using CD- R/CD-RW and scanners and digital cameras. In the latter two, there is a clear pattern of increased perception of proficiency from S2 to S6.

Table 7.34: Students' self-rating of proficiency in using/operating hardware (Students' Questionnaire, Q. 21)

Perceived proficiency		Mean (0-4)	SE	N	% of students choosing the option				
					Highly proficient	Basically proficient	Know some	Not proficient	Know nothing at all
S2	Printer	3.2	0.03	2068	47.4	35.9	10.4	3.8	2.5
	CD-R/CD-RW	2.8	0.03	2068	35.1	29.5	18.5	10.7	6.3
	Digital Camera	2.4	0.03	2066	24.1	27.9	23.8	15.5	8.8
	Digital Video Recorder	2.0	0.03	2065	14.2	22.8	27.4	22.4	13.3
	Scanner	2.4	0.03	2065	24.9	27.4	22.2	16.1	9.4
S4	Printer	3.2	0.02	2024	39.7	45.3	10.4	2.9	1.7
	CD-R/CD-RW	2.7	0.03	2027	31.9	32.8	17.6	11.7	5.9
	Digital Camera	2.5	0.03	2027	25.8	31.5	21.8	13.7	7.3
	Digital Video Recorder	2.0	0.03	2024	12.8	23.9	26.6	24.6	12.1
	Scanner	2.5	0.03	2023	23.9	33.0	20.2	15.3	7.6
S6	Printer	3.3	0.02	1840	41.1	50.0	7.4	1.2	0.4
	CD-R/CD-RW	2.7	0.03	1840	30.7	36.1	14.7	12.0	6.5
	Digital Camera	2.7	0.03	1839	27.3	37.1	19.6	11.4	4.6
	Digital Video Recorder	1.9	0.03	1838	10.7	22.7	26.9	28.1	11.5
	Scanner	2.6	0.03	1836	22.4	38.2	19.4	13.1	6.9

There is evidence of a general trend for increased self-rating of proficiency from S2 to S6 in use of word processing software, online communication tools and searching and using information on the Internet (Table 7.35, Students' Questionnaire item 20). There is a reverse trend of decreasing ratings of themselves as basically or highly proficient from S2 to S6 in use of spreadsheets, presentation software, designing webpages/sites, designing computer graphics/drawing and using multi-media software. Comparing Student Questionnaire item 20 on this Study to Student Questionnaire item 8 of the Preliminary Study, we can see that the mean ratings are almost identical. The only slight difference is on designing computer graphics/drawing, where the mean for this Study is 2.1 or lower (on a scale from 0 to 4) while that of the Preliminary Study was 2.9 (on a scale from 1 to 5) which suggests that the students in the latter perceived themselves to be slightly less proficient than the students in this Study.

Searching and using information on the Internet had the highest proportions of students from all secondary grade levels rating themselves as basically or highly proficient, but there is quite a big increase from 82.5% of S2 to 90.1% of S6. The areas in which the students rated their proficiency lowest were designing web pages and using multimedia software (less than 37% in all cases rating themselves as basically or highly proficient). This relates to the finding presented earlier that students' consider themselves to be proficient at general computer usage but less so in using more specialised tools. Proficiency with word-processing was rated lower than might have been expected (only 63.3% of S2, 64.4% of S4 students and 75.6% of S6 students rating themselves as basically/highly proficient).

Table 7.35: Students' self-rating of proficiency in software use (Students' Questionnaire, Q. 20)

	Perceived proficiency	Mean (0-4)	SE	N	% of students choosing the option				
					Highly proficient	Basically proficient	Know some	Not proficient	Know nothing at all
S2	Using word processing software	2.7	0.03	2069	19.4	43.9	25.0	7.5	4.3
	Using spreadsheets	2.5	0.03	2066	15.4	41.4	29.4	9.5	4.0
	Using presentation software	2.8	0.04	2058	26.5	41.1	21.7	7.1	3.6
	Using online communication tools	3.1	0.03	2063	42.6	36.2	15.2	3.5	2.5
	Searching and using information on the Internet	3.2	0.03	2055	43.5	39.0	13.7	2.3	1.5
	Designing web pages/sites	2.1	0.03	2064	10.6	26.3	34.3	18.7	10.1
	Designing computer graphics/drawing	2.1	0.02	2058	8.4	26.1	39.4	18.4	7.7
	Using multi-media software	1.8	0.03	2056	7.6	20.2	32.4	23.8	16.0
S4	Using word processing software	2.7	0.03	2026	16.1	48.3	25.2	7.2	3.2
	Using spreadsheets	2.4	0.02	2028	8.4	40.6	33.6	13.5	4.0
	Using presentation software	2.6	0.03	2024	17.7	45.5	23.4	9.2	4.3
	Using online communication tools	3.1	0.02	2028	40.1	40.7	13.8	4.1	1.3
	Searching and using information on the Internet	3.2	0.02	2021	40.8	43.6	12.8	1.8	1.0
	Designing web pages/sites	1.9	0.03	2025	6.5	24.5	34.1	22.6	12.4
	Designing computer graphics/drawing	1.7	0.03	2024	5.0	20.8	32.7	26.6	15.0
	Using multi-media software	1.5	0.03	2017	3.9	17.4	29.2	28.6	20.9
S6	Using word processing software	2.9	0.02	1839	20.0	55.6	18.1	4.7	1.6
	Using spreadsheets	2.2	0.03	1838	7.5	35.2	33.9	18.0	5.4
	Using presentation software	2.6	0.03	1835	14.2	45.9	24.5	12.0	3.5
	Using online communication tools	3.2	0.02	1838	38.9	46.3	12.0	2.0	0.9
	Searching and using information on the Internet	3.3	0.02	1838	41.3	48.8	8.5	1.0	0.5
	Designing web pages/sites	1.5	0.04	1839	4.6	18.2	25.7	29.7	21.9
	Designing computer graphics/drawing	1.3	0.03	1836	3.4	10.5	23.3	36.7	26.1
	Using multi-media software	1.1	0.03	1837	2.6	8.2	19.4	32.7	37.1

7.5.5 IT literacy assessment outcomes

ITLA Section 1 (Computer knowledge and skills)

As explained in Chapter 4, in order to examine the extent to which the students had met the criterion-based expectations of IT targets on the ITLA Section 1, three categories of indicator were used: those who were able to answer less than 50% of the items correctly, those who were able to answer from 50% to 80% of the items correctly and those who were able to answer more than 80% correctly. Students who scored above 80% were considered to have complete mastery of the stage-specific knowledge and skills, since a 20% tolerance level was set up to allow for random variation which may affect the test score from a variety of sources, such as distractions in the assessment environment, the occasion of testing, the rater, the examinee's state of mind at the time of testing, etc. It is not intended to be a cut-off point implying pass/fail or competence/incompetence since students' competence should be conceived of as a continuum of skills rather than a dichotomy, and any chosen tolerance level is arbitrary. Those who scored from 50% to 80% were considered to have at least a reasonable grasp.

In Section 1 of the ITLA (Table 7.36) only 20.2% of S2 students, 25.2% of S4 students and 23.5% of S6 students had more than 80% of their answers correct, with 68.4%, 62.9% and 70.4% for S2, S4 and

S6 students respectively falling into the 50%-80% category. Only a small proportion of students (11.4% for S2, 11.9% for S4 and 6.1% for S6) scored lower than 50%. The high percentages scoring 50% correct or more, coupled with the findings reported earlier (Section 7.5.4) concerning students' self-rated proficiency in hardware and software skills, suggest that the majority of students have at least a reasonable grasp of stage-specific technological knowledge and skills.

Table 7.36: Distribution of students' ITLA Section 1 scores

% of correct	S2 (N = 512)	S4 (N = 517)	S6 (N = 474)
	%	%	%
< 50%	11.4	11.9	6.1
50 – 80%	68.4	62.9	70.4
> 80%	20.2	25.2	23.5
Total	100	100	100

ITLA Section 2 (Self-perceived ability in generic IT skills)

Table 7.37: Distribution of students' scores in ITLA Section 2 (ITLA Section 2, Q1-20)

Self-perceived proficiency		Mean (0-4)	SE	N	% of students choosing the option				
					Highly proficient	Basically proficient	Know some	Not proficient	Know nothing at all
S2	Switch the computer on and shutdown correctly	3.9	0.02	509	89.8	7.3	2.8	0.0	0.0
	Use computer software for self learning	3.1	0.04	510	33.1	44.0	21.0	1.3	0.7
	Use an electronic/Internet dictionary/ encyclopedia	3.1	0.04	510	42.7	34.0	19.6	2.5	1.3
	Input Chinese texts	3.4	0.03	507	54.0	33.5	11.0	1.2	0.2
	Do homework/write reports	3.2	0.04	507	42.3	42.3	13.6	1.6	0.2
	Create statistical diagrams	3.0	0.04	509	29.8	42.9	21.6	5.0	0.7
	Create presentation materials	3.1	0.04	506	36.1	41.3	16.4	4.8	1.5
	Search for information from the Internet	3.5	0.04	504	64.7	25.9	7.2	1.8	0.5
	Create a webpage/set up a website	2.3	0.05	509	13.9	30.4	32.5	15.1	8.2
	Produce a multimedia clip/animation	1.9	0.05	508	6.7	27.4	30.4	22.1	13.3
	Edit an image or typeset	2.9	0.04	509	30.6	38.8	21.7	6.2	2.8
	Create/use a database	2.1	0.05	509	10.0	27.9	32.7	19.6	9.8
	Share/discuss in a news group/discussion forum	2.5	0.05	509	23.5	27.0	30.8	12.1	6.6
	Download information/software from the Internet	3.3	0.04	507	49.7	33.8	11.3	3.3	1.9
	Distinguish the credibility of Internet information/news	2.8	0.05	508	26.4	36.2	26.9	7.2	3.3
	Use Internet securely	3.2	0.04	507	41.5	37.8	16.7	3.2	0.8
	Protect the computer from a virus/hacker attack	2.8	0.05	506	34.2	30.5	24.2	8.4	2.8
	Deliver documents/information to others	3.5	0.04	508	64.0	22.7	9.9	1.6	1.8
	Solve problems related to learning	2.9	0.04	510	27.1	43.3	23.2	4.9	1.6
	Solve problems related to daily life	2.7	0.05	510	24.7	34.8	26.5	11.4	2.6

Self-perceived proficiency		Mean (0-4)	SE	N	% of students choosing the option				
					Highly proficient	Basically proficient	Know some	Not proficient	Know nothing at all
S4	Switch the computer on and shutdown correctly	3.8	0.02	509	85.2	11.8	2.3	0.0	0.7
	Use computer software for self learning	2.8	0.04	508	22.4	46.0	25.0	5.1	1.6
	Use an electronic/Internet dictionary/ encyclopedia	3.0	0.04	509	33.5	38.7	21.3	4.8	1.7
	Input Chinese texts	3.3	0.04	508	49.6	34.3	11.7	2.8	1.7
	Do homework/write reports	3.1	0.04	507	32.5	46.4	17.2	2.0	1.8
	Create statistical diagrams	2.4	0.04	509	12.8	35.7	37.2	10.4	3.8
	Create presentation materials	2.8	0.04	509	22.5	46.3	20.6	7.5	3.1
	Search for information from the Internet	3.5	0.04	505	61.9	26.8	8.2	1.4	1.7
	Create a webpage/set up a website	2.0	0.05	508	8.7	22.7	36.7	19.0	12.9
	Produce a multimedia clip/animation	1.6	0.05	506	4.9	16.4	32.0	29.0	17.8
	Edit an image or typeset	2.4	0.05	507	18.7	32.6	29.8	12.4	6.6
	Create/use a database	1.8	0.05	509	5.4	21.2	36.7	23.9	12.8
	Share/discuss in a news group/discussion forum	2.3	0.06	507	17.4	29.5	28.5	16.9	7.8
	Download information/software from the Internet	3.2	0.04	509	45.4	38.5	11.8	2.5	1.9
	Distinguish the credibility of Internet information/news	2.7	0.04	509	21.6	40.5	27.6	6.5	3.8
	Use Internet securely	3.0	0.04	509	34.4	41.6	18.2	4.0	1.9
	Protect the computer from a virus/hacker attack	2.7	0.04	507	26.7	36.3	24.6	10.1	2.4
	Deliver documents/information to others	3.4	0.04	509	61.3	26.1	9.8	1.4	1.5
	Solve problems related to learning	2.7	0.04	509	19.5	42.0	30.7	5.2	2.7
	Solve problems related to daily life	2.7	0.04	509	21.6	39.5	27.3	7.8	3.8
S6	Switch the computer on and shutdown correctly	3.8	0.02	463	86.7	11.6	1.6	0.1	0.0
	Use computer software for self learning	2.8	0.04	463	19.6	49.1	25.3	5.3	0.7
	Use an electronic/Internet dictionary/ encyclopedia	3.1	0.04	463	35.9	41.3	16.8	6.0	0.0
	Input Chinese texts	3.2	0.04	463	43.4	35.2	15.5	5.1	0.8
	Do homework/write reports	3.1	0.04	463	36.9	46.1	11.9	5.2	0.0
	Create statistical diagrams	2.3	0.07	463	11.6	36.8	30.0	17.1	4.6
	Create presentation materials	2.6	0.05	462	18.4	46.4	22.1	9.3	3.7
	Search for information from the Internet	3.6	0.02	463	60.7	35.7	3.3	0.3	0.0
	Create a webpage/set up a website	1.6	0.07	463	6.8	21.5	23.7	23.9	24.1
	Produce a multimedia clip/animation	1.1	0.06	463	2.1	10.8	19.5	32.0	35.6
	Edit an image or typeset	2.2	0.05	462	9.8	30.4	34.6	17.2	8.0
	Create/use a database	1.4	0.05	462	2.4	11.5	28.9	33.4	23.9
	Share/discuss in a news group/discussion forum	2.5	0.05	462	17.2	37.5	25.9	13.3	6.1
	Download information/software from the Internet	3.2	0.03	463	41.9	41.0	14.5	2.4	0.2
	Distinguish the credibility of Internet information/news	2.6	0.04	461	16.8	40.8	32.9	7.4	2.1
	Use Internet securely	2.9	0.04	462	24.7	44.5	24.7	5.4	0.7
	Protect the computer from a virus/hacker attack	2.6	0.04	463	21.8	33.3	26.8	14.5	3.6
	Deliver documents/information to others	3.5	0.03	462	57.5	36.2	5.4	0.9	0.0
	Solve problems related to learning	2.8	0.03	463	21.0	47.5	25.9	4.8	0.8
	Solve problems related to daily life	2.8	0.04	463	22.4	47.8	22.1	7.3	0.5

Table 7.37 shows the students' responses to the second part of the ITLA. The highest proportions rated themselves as basically or highly proficient on searching for information on the Internet (S2: 90.6%, S4: 88.7%, S6: 96.4%), delivering documents and information to others via the web (S2: 86.7%, S4: 87.4%, S6: 93.7%), inputting Chinese texts (S2: 87.5%, S4: 83%, S6: 78.6%), doing homework using, for example, Word (S2: 84.6%, S4: 78.9%, S6: 83%) and downloading information from the Internet (S2: 83.5%, S4:83.9%, S6:82.9%). On most of the others 70% or less of the S2 students, 75% or less of the S4 students and 60% or less of the S6 students reported themselves to be basically or highly

proficient.

The three applications that had the lowest proportions of students reporting themselves to know the basics or be proficient were the same across all grade levels: newsgroups (50.5% for S2, 46.9% for S4 and 54.7% for S6), databases (37.9% for S2, 26.6% for S4 and 13.9% for S6) and producing a multimedia clip (34.1% for S2, 21.3% for S4 and 12.9% for S6). It is interesting to note that there is a decrease from S2 to S6 in their perceptions of proficiency at producing multimedia clips and using databases, but more S6 students perceive themselves to be proficient at using newsgroups than S2 and S4 students. Two particularly marked trends are the steady decline from S2 to S6 in their reported proficiency to create statistical diagrams using, for example, Excel and edit images, for example with Paint.

Overall there is a reasonably high proportion of students who said that they were basically or highly proficient at using IT to solve real problems (59.5% of S2, 61.1% of S4 and 70.2% of S6 students) and to solve problems related to learning (70.4% of S2, 61.5% of S4 and 68.5% of S6 students).

7.5.6 Students' attitudes towards IT

Item 28 in the Students' Questionnaire (Table 7.38, Students' Questionnaire item 28) was written in behavioural terms to reflect the appropriateness of students' attitude towards computer use. Around 80% (82.3% of S2, 83.3% of S4 and 77.5% of S6) of all students reported that they usually or always spend long periods of time playing computer/online games during holidays. This is consistent with findings reported earlier about the popularity of games, and was also reported in a survey conducted by Choice Magazine (2003). This was also a concern expressed in the interviews with school heads and teachers, with some cases cited of students spending days and nights on the Internet and sometimes skipping school to do so. This kind of behaviour was also corroborated by the Choice Magazine survey. Otherwise, however, the responses to this item demonstrate that there is some level of awareness and, generally, more than 80% reported that they do not engage in inappropriate practices. One of the alarming findings is the increased reported use of illegal software from 35.5% in S4 to 41.3% in S6.

It is interesting to note that use of IT to share views, feelings or interests with others was only rated usually or always by 28.6% of S2, 34.4% of S4 and 39% of S6 students, which is perhaps not as high as expected since an aim of ITEd is to promote this kind of sharing.

Table 7.38: Students' self-reported behaviours in using IT (Students' Questionnaire, Q. 28)

Activities	**S2**					**S4**				
	% of students choosing the option				**N**	**% of students choosing the option**				**N**
	Always	**Occasionally**	**Rarely**	**Never**		**Always**	**Occasionally**	**Rarely**	**Never**	
a.	42.1	40.2	13.6	4.1	2065	40.5	42.8	12.5	4.2	2028
b.	15.6	36.9	35.6	12.0	2060	20.8	42.1	30.0	7.1	2027
c.	1.5	3.9	8.8	85.8	2061	2.2	5.5	13.7	78.5	2026
d.	5.8	17.4	31.8	45.0	2047	4.2	17.9	32.2	45.8	2021
e.	2.6	9.1	20.7	67.6	2065	2.3	10.6	25.2	62.0	2027
f.	2.0	4.1	8.6	85.3	2063	2.2	3.0	7.7	87.1	2026
g.	8.3	20.3	32.1	39.2	2060	10.2	24.2	32.6	32.9	2024
h.	8.8	14.7	25.1	51.4	2048	13.9	21.6	29.2	35.3	2023

Activities	S6				
	% of students choosing the option				N
	Always	Occasionally	Rarely	Never	
a.	31.1	46.4	16.7	5.9	1840
b.	17.9	42.6	30.9	8.6	1840
c.	1.7	7.1	18.5	72.7	1840
d.	4.2	15.0	30.0	50.8	1836
e.	1.0	7.0	23.5	68.6	1840
f.	0.4	1.2	4.9	93.5	1839
g.	11.8	27.2	33.7	27.3	1838
h.	16.3	25.0	30.2	28.4	1837

a. Spending long period of time on playing computer/online games during holidays
b. Paying attention to new IT products and services
c. Browsing websites containing pornographic materials
d. Sending/forwarding E-mail/messages to friends even though you are not sure of the accuracy of the E-mail/messages
e. Disclosing personal particulars to strangers online
f. Playing jokes on friends by sending E-mail bombs or computer virus
g. Using IT to share your views/feelings/interests with others
h. Using pirated (illegal) software

7.5.7 Perceived impacts of IT on students

Table 7.39: Heads' perceptions of impacts of ITEd on students (School Heads' Questionnaire, Q. 9c)

Impacts	Mean (0-4)	SD	N	% of heads choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
Increased subject knowledge	3.1	0.6	368	20.9	70.1	8.4	0.5	0.0
Improved computer skills	3.5	0.5	369	47.2	51.2	1.6	0.0	0.0
Enhanced creativity	2.8	0.7	369	15.2	55.6	27.6	1.4	0.3
Improved communication and expression skills	2.6	0.8	369	11.1	44.2	37.1	6.8	0.8
Strengthened co-operation with others	2.6	0.8	369	9.2	44.4	42.0	2.7	1.6
Weakened interpersonal skills due to excessive time spent on computers	2.1	0.9	369	6.0	28.5	41.5	22.5	1.6
Negligence of school work due to excessive time spent on computers	1.9	1.0	369	5.4	22.0	37.1	31.2	4.3
Stimulated interest in learning	3.0	0.5	369	10.0	78.3	11.4	0.3	0.0
Increased initiative to learn	2.8	0.6	368	7.6	62.8	26.9	2.5	0.3
Increased confidence	2.6	0.7	367	6.0	52.0	39.2	2.5	0.3
Improved learning effectiveness	2.9	0.6	368	10.6	69.6	18.8	0.8	0.3
Widened perspective through enlarged social circle	2.4	0.8	368	4.9	39.1	44.6	10.6	0.8
More opportunity for being exposed to unhealthy information	2.6	0.9	366	9.6	53.3	24.3	11.8	1.1
Developed high-level thinking	2.4	0.7	366	4.4	34.4	54.9	6.3	0.0

As can be seen in Table 7.39 above (School Heads' Questionnaire item 9c), the secondary school heads expressed a strong belief that ITEd has had an impact on students' increased subject knowledge, improved computer skills and learning effectiveness, as well as affective factors including stimulated interest and, to a slightly lesser extent, increased initiative to learn. To a lesser extent but also quite strongly, the principals reported that ITEd has had impacts on enhanced creativity and confidence. Only slightly more than half thought there has been an impact on improved communication and expression skills, strengthened co-operation with others. The majority of heads did not report any perceived negative impacts, except for the clear exception of 62.9% saying IT use creates more opportunity for being exposed to unhealthy information. The school heads' mean ratings for corresponding items on the Preliminary Study were very similar to these. The example below from an interview with a school head indicates the impression that ITEd has had some impact:

Especially in the lower forms, teaching and learning are more interactive. Students are guided, in Project-Based Learning, to search for information and to use their minds to consider and discuss what is useful.

However, in the school heads' interviews it was also observed that there have been some negative impacts. It has been noticed that student's motivation to learn in class is lowered as they discovered a more dynamic channel on the Internet. Students' focus in their study has been distracted by other attractions on the Internet/computer such as games. School heads reported they have discovered students who were absent from class playing on computers in the internet café nearby the school.

Similarly, as can be seen from Table 7.40 (Teachers' Questionnaire item 14e), the secondary school teacher respondents also indicated their belief that IT has impacted on students' increased subject knowledge and interest in learning (more than 83% agreeing or strongly agreeing with these impacts), improved learning effectiveness and easier and deeper understanding of the lesson and increased initiative to learn (close to or above 70%). On the other hand, only 31.8% of the teachers feel strongly that IT use has contributed to any clear progress in academic performance. This was further supported by the teacher focus group interviews, in which some of the teachers expressed the concern that the use of IT cannot help students to develop analytic skills because they often do little more than cut and paste information from the Internet without analyzing or synthesizing. The following quotations from teacher focus group interviews illustrate this concern:

Students like surfing on the net, so they will look for everything on the net. But they haven't built up a continuous learning habit. They were asked to handle a 15-week project. They were supposed to post information onto the site and discuss with their classmates every week, but it was clear that they only did something to meet the deadlines. Their learning attitude is still quite passive.

Students are so used to getting a whole lot of information conveniently from the Internet that they have built up the habit of just glancing through the information instead of digesting it. They are just collecting data, not analyzing and making use of data. They are moving backward in terms of learning.

This same idea also came through the student focus group interviews. While there are certainly signs of some shift in the students' learning paradigm and they are now using the Internet extensively to search for information, there was little evidence of students being selective or critical of the credibility of the information and, when asked if their teachers teach them to search selectively and critically the majority said that they do not.

On the positive side, however, one group of teachers reported some of the benefits:

Students' projects and essays are put on the intranet for sharing.

We use IT as a collective creative tool such as composition.

It was experienced in the arts class that teaching can be enhanced by using students as resources for information gathering and research before class. This practice helps students go through a self-learning process and actual class discussion can be enhanced and more productive.

Table 7.40: Teachers' perceptions of benefits to students of IT use in their most satisfying lessons with IT (Teachers' Questionnaire, Q. 14e)

Benefits	**Mean (0-4)**	**SE**	**N**	**% of teachers choosing the option**				
				Strongly agree	**Agree**	**Neutral/ uncertain**	**Disagree**	**Strongly disagree**
Increased subject knowledge	3.1	0.01	6162	26.2	63.5	9.0	1.1	0.3
Improved computer skills	2.1	0.02	6088	5.9	33.4	36.8	17.1	6.8
Improved information processing ability	2.4	0.02	6080	7.0	44.9	32.3	11.0	4.7
Enhanced creativity	2.3	0.01	6094	7.2	40.6	36.0	11.9	4.3
Improved communication and expression skills	2.4	0.01	6085	7.4	43.8	33.5	11.6	3.8
Learned to co-operate with others	2.4	0.01	6096	7.1	43.8	31.7	12.5	4.9
Stimulated interest in learning	3.0	0.01	6160	18.0	65.8	14.4	1.3	0.5
Increased initiative to learn	2.7	0.01	6118	13.2	54.0	26.7	4.6	1.6
Increased confidence	2.5	0.01	6096	8.4	42.0	39.1	7.8	2.7
Improved learning effectiveness	2.8	0.01	6097	12.8	59.9	23.1	3.3	0.9
Enlarged social circle	1.9	0.02	6065	3.7	23.1	46.0	18.7	8.6
Widened perspective through more interaction with the outside world	2.4	0.01	6078	8.3	45.2	31.7	10.3	4.6
Greater concentration in learning	2.5	0.01	6104	7.8	44.4	37.8	7.8	2.3
Easier and deeper understanding of the lesson	2.8	0.01	6120	13.5	60.4	22.4	3.1	0.5
Clear progress in academic performance	2.2	0.01	6057	4.3	27.5	56.5	9.2	2.5

The heads' and teachers' perception of increased interest is further supported by the students' views of what they have gained from IT use in class (Table 7.41, Students' Questionnaire item 13b). Increased subject knowledge again has the highest proportions of students agreeing or strongly agreeing to it as an impact (78.9%, 74.1% and 73.5% of S2, S4 and S6 students respectively). The next highest is stimulated interest in learning (73.5% of S2 and 69.9% S4 students but only 64.3% of S6 students). There are progressive decreases from S2 to S6 in the proportions agreeing or strongly agreeing on the impacts of several aspects including improved computer skills, improved information processing ability, enhanced creativity, improved communication and expression, improved co-operation with others, stimulated interest in learning, increased initiative to learn, increased confidence and enlarged social circle.

Table 7.41: Students' perceptions of what they have gained from their lessons they like the most with IT application (Students' Questionnaire, Q. 13b)

	Perceived gain	Mean (0-4)	SE	N	% of students choosing the option Strongly Agree	Agree	Neutral/ Uncertain	Disagree	Strongly Disagree
S2	Increased subject knowledge	3.0	0.02	2062	22.9	56.0	18.0	2.2	0.9
	Improved computer skills	2.7	0.02	2063	20.6	41.4	27.5	9.0	1.6
	Improved information processing ability	2.7	0.02	2061	15.3	45.4	30.0	7.8	1.5
	Enhanced creativity	2.4	0.02	2059	13.4	32.9	40.1	11.1	2.5
	Improved communication and expression skills	2.3	0.03	2058	11.7	28.9	41.9	14.5	3.0
	Learned to co-operate with others	2.5	0.03	2055	13.2	39.3	32.9	11.5	3.1
	Stimulated interest in learning	2.9	0.02	2058	23.4	50.1	19.9	4.8	1.8
	Increased initiative to learn	2.5	0.02	2058	14.3	34.7	38.8	9.8	2.4
	Increased confidence	2.2	0.03	2053	10.0	25.1	44.6	16.1	4.3
	Improved learning effectiveness	2.6	0.02	2056	14.6	44.0	32.4	7.2	1.8
	Enlarged social circle	2.3	0.03	2060	12.3	27.0	40.0	15.7	5.0
	Widened perspective through more interaction with the outside world	2.6	0.03	2056	18.7	37.4	30.9	9.3	3.8
S4	Increased subject knowledge	2.8	0.02	1978	13.0	61.1	20.8	4.3	0.8
	Improved computer skills	2.2	0.03	1980	9.4	30.2	36.2	20.5	3.7
	Improved information processing ability	2.3	0.03	1977	7.8	37.4	37.1	14.8	3.0
	Enhanced creativity	2.2	0.02	1979	6.0	28.3	44.4	18.1	3.2
	Improved communication and expression skills	2.1	0.02	1974	5.6	28.7	42.1	19.6	4.1
	Learned to co-operate with others	2.2	0.03	1980	6.7	32.6	39.8	16.7	4.2
	Stimulated interest in learning	2.8	0.02	1980	14.9	55.0	22.3	6.5	1.4
	Increased initiative to learn	2.4	0.02	1977	9.0	36.0	40.3	12.1	2.6
	Increased confidence	2.0	0.02	1978	5.2	19.7	50.3	19.0	5.7
	Improved learning effectiveness	2.6	0.02	1979	9.6	49.3	30.8	8.2	2.1
	Enlarged social circle	2.0	0.03	1973	6.6	18.9	46.2	21.0	7.4
	Widened perspective through more interaction with the outside world	2.4	0.03	1973	11.3	36.8	33.9	13.4	4.6
S6	Increased subject knowledge	2.8	0.02	1792	10.3	63.2	20.9	4.5	1.1
	Improved computer skills	1.9	0.04	1792	5.8	21.4	32.5	33.5	6.8
	Improved information processing ability	2.1	0.04	1792	5.9	29.9	35.5	23.1	5.6
	Enhanced creativity	1.8	0.03	1794	2.8	19.8	40.6	30.5	6.3
	Improved communication and expression skills	1.9	0.02	1791	3.8	26.1	37.0	27.1	6.1
	Learned to co-operate with others	2.0	0.03	1793	3.7	27.8	34.8	27.6	6.1
	Stimulated interest in learning	2.6	0.02	1791	9.4	54.9	24.9	8.5	2.4
	Increased initiative to learn	2.2	0.03	1791	4.9	33.1	40.4	18.0	3.6
	Increased confidence	1.8	0.03	1793	2.4	15.3	46.4	28.5	7.4
	Improved learning effectiveness	2.4	0.03	1793	7.1	46.8	31.0	12.2	2.9
	Enlarged social circle	1.6	0.03	1792	2.6	11.1	40.2	34.2	11.9
	Widened perspective through more interaction with the outside world	2.2	0.03	1789	9.7	34.1	31.5	18.0	6.7

The above patterns are supported further by the students' perceptions of the impact of their teachers using IT as opposed to using it themselves in class (Students' Questionnaire item 10). 68.5% of S2 students, 62.6% of S4 students and 51.4% of S6 students agreed or strongly agreed that classes have become more interesting as a result of their teachers using IT – a quite substantial decrease in the proportions of S6 students. Only around half of the S2 and S4 students (47.8% to 54.6%) and around 42% of the S6 students agreed or strongly agreed that the teachers' use of IT has made it easier for them to-understand subject content and to tackle some of their learning problems. Very few of the secondary students seemed to have a strong agreement that IT use has improved their academic performance. This perception is also supported by the student focus group interview data, in which most of the students said they thought IT may be of some help in their studies through giving them easier access to information and a wider view of the world, but that there has been no great improvement in their results or examination marks as a consequence of using IT. Quite a high proportion (65.3% of S2 and 64.9% of S4 and 71.6% of S6) thought students without home computers would be disadvantaged. Parents, on the other hand, were less sure about the impacts of home computers on their teenagers' academic results, with around half or slightly above saying there was no impact (Parents' Questionnaire item 4a). It may be interesting to note that slightly more parents of S4 students indicated the belief that home computers had negative impacts on their teenagers' achievement, however these percentages are quite low (33% of S4 parents compared to 25.3% and 21.5% of S2 and S6).

Generally the mean ratings shown in Table 7.40 (Teachers' Questionnaire item 14e) are slightly higher relative to the corresponding means in the Preliminary Study, but only by half a point or less. Similarly the mean ratings shown in Table 7.41 (Students' Questionnaire item 13b) are slightly higher relative to the corresponding means in the Preliminary Study, but only by half a point or less.

It must be noted, however, that while the qualitative data suggest that principals, teachers and students themselves think IT use has had an impact on student outcomes, the support for this from the qualitative data is more conservative. School heads and teachers expressed similar opinions, that IT is important to the future development of Hong Kong but that it is only a tool and, by itself has not had any impact on achievement scores, examination results, attitudes, analytical skills or problem solving skills and will not bring about any paradigm shift. They uniformly believed that to bring this about it is necessary to change a combination of factors including class size, curriculum, the examination system, parents' views and the evaluation system of the community in general.

<u>7.5.8 Impediments to use of IT as perceived by the students</u>

The most commonly checked impediments to the use of IT (Students' Questionnaire item 26) are parents' failure to recognize the importance of IT or misunderstanding the reasons for using computers (36.8% of S2, 35.7% of S4 students and 31% of S6 students), insufficient time allowed for students to use computer facilities at school and insufficient computer facilities at home (around 30% of each group). 32.7% of the S6 students said that insufficient computer-related courses in school was an impediment but this was only indicated by less than 29% of the S2 and S4 students. Otherwise, none of the obstacles were reported by more than 30% of students and 21.2% to 24.7% said they had not encountered any obstacles at all.

Chapter 8 Further Analyses of the Primary and Secondary School Data

This chapter considers some further analyses that were undertaken to provide deeper insights about the impact of the ITEd initiative. First, it describes some examples of pedagogical use that were observed during the School Visits, in order to give a more in-depth picture of some of the practices that are currently occurring. The second section describes some further quantitative analyses that were conducted to explore relationships between key variables identified in the Theoretical Framework, with a particular emphasis on teachers' pedagogical practices and student learning.

8.1 Examples of pedagogical use of IT

In addition to what was reported in Chapters 6 and 7 about the pedagogical use of IT, the Classroom Visits provided further evidence of teachers' pedagogical use of IT in class. A deeper level of understanding of what teachers are actually doing can be obtained from examination of these observations. It must be emphasised that the intention here is to describe how IT is used by teachers and how students react rather than assess the effectiveness of individual teachers or their practices in enhancing students' learning outcomes, as it is not possible to make judgments from this kind of one-off classroom observation without a deeper investigation of student learning outcomes.

In the literature review presented in Chapter 2 there were three main ways described of utilising IT in education. These were teaching with IT, learning from IT and learning with IT. This section will describe some examples of each of these approaches that were observed during the Classroom Visits. It is important to note that these three approaches all have their uses for different purposes and hence we are not claiming that one is necessarily better than the other in terms of teaching or learning experiences. It is also important to be aware that these three approaches are not directly related to teacher-centredness or student-centredness. As will be illustrated by some of the examples here, depending on the focus of the pedagogical strategy and instructional design, it is feasible to have learning that is teacher-centred, student-centred or some combination of these within any of the approaches of teaching with, learning from and learning with IT.

Teaching with IT

Most of the examples of teaching with IT were concerned with using it for presentation. Of the 74 primary school classrooms visited, IT was used in 66. In the Secondary School Sector, IT was used in 89 of the 123 classes visited.

A breakdown of classes observed by subjects is shown in Tables 8.1 and 8.2.

Table 8.1: Breakdown of classes observed by subject (primary schools)

Subjects	No. of classes observed	No. of classes observed with use of IT
English	19	19
Chinese	15	13
Mathematics	15	13
General Studies	5	4
Computer/IT	4	4
Art	7	4
Music	2	2
Putonghua	2	2
Physical Education	1	1
Reading	1	1
Moral and Civic	3	3
Total	74	66

Table 8.2: Breakdown of classes observed by subject (secondary schools)

Subjects	No. of classes observed	No. of classes observed with use of IT
Accounting	3	0
Art	3	3
Biology	5	5
Chemistry	4	4
Chinese	17	13
Chinese History	5	4
Chinese Literature	7	3
Commerce	1	1
Computer Applications	2	2
Computer Literacy	2	2
Design and Technology	2	1
Economics	2	1
EE	1	1
English	22	15
Geography	6	5
History	3	1
Home Economics	1	1
Integrated Science	4	4
Mandarin	3	3
Mathematics	16	9
Mathematics and Statistics	1	0
Music	2	2
Physical Education	3	0
Physics	4	3
Principles of Accounting	1	1
Pure Mathematics	2	2
Religious Studies	2	2
Use of English	1	1
Total	125	89

There was a wide range in use, from minimal to more active, but the observations confirm further that it was mostly teacher directed. In 42 of the 66 observed primary classes and 70 of the 89 observed secondary classes in which IT was used the teacher was the only person to touch the computer. There were 24 primary classes and 19 secondary classes in which the students had some hands-on IT use, but the lesson was still very much controlled by the teacher at the front. In 15 and 16 of these classes in primary and secondary schools respectively, the whole class was using computers while in the other 9 (primary) and 3 (secondary) the student use mainly involved them coming out to click the answer, use the visualiser to demonstrate their work or help the teacher to set up the computer. There was some indication that teachers tried to be adventurous in using IT in their teaching in primary schools and even more so in lower secondary levels, both in classes and in project-based learning. In higher forms, however, pressure from public examinations has reduced such usage.

Within this category, there was a considerable amount of variation in the way the computers were used, ranging from simple PowerPoint presentations to use of the computer in ways that other media could not have achieved as effectively. The most common use of IT in the observed classes in both primary and secondary schools took the form of expository teaching in which teachers gave presentations to the whole class making use of their own PowerPoint slides or publishers' pre-prepared slides. In fact there was quite a lot of use observed of the latter. This again reinforces the perception that the paradigm has not yet changed drastically despite the fact that the EMB Document Analysis has revealed quite a large number of professional development activities, workshops and exhibitions that were concerned with promoting the use of IT in teaching and learning. Occasionally, websites, browsers, ETV or video files/clips were used. Some teachers used IT as a tool to illustrate some abstract concepts, for example in Mathematics. The observations described in this section are all examples of the teachers teaching *with* IT.

In some of these lessons the teacher was in control of the computer and there was very little engagement with students. Even for those lessons where there was more use, in terms of time, the activity was usually teacher-centred and there was very little opportunity for the students to interact with the computer or their peers. As mentioned above, the only hands-on use made by students in general classrooms was very minimal, such as coming out to make a selection and click a button. Many teachers are using PowerPoint as they previously used the blackboard, and often make use of the blackboard as a supplement to PowerPoint.

In the expository teacher-centred types of lessons there were some examples of poor instructional design. For example, in one primary school case, a teacher taught an environmental topic by showing the classes an ETV programme in digitised format using PowerPoint for 25 minutes continually without a break and without any questions for the children to focus on. The whole class just sat and watched without anything to do and they appeared to be extremely bored (although they were still paying attention). In many of these classes observed, students were found to engage in private conversation or even fall asleep during the teacher's PowerPoint presentation. Sometimes as many as 10 students were observed sleeping while the teacher was playing a long video. Students' interest was clearly a consequence of the teacher's ability to engage them in the lesson through effective pedagogical design, not a direct consequence of the IT itself.

In some cases, in both primary and secondary schools, where IT was being used for presentation purposes, it was observed that the best use of the presentation software was not made. Sometimes, too many lights were left on and the projected image from the LCD projector was difficult to read. On other occasions some teachers put too many words (or even an entire essay) on a single PowerPoint slide so that the words were too small to read except for the handful of students sitting in the front rows.

On the other hand, some of the lessons observed, even where the IT was used solely as a presentation tool, used more effective instructional design than described above, and encouraged more interaction and thinking on the part of the students. This often involved an interactive question-and-answer approach incorporating the presentation software, where the information was presented in sections and questioning techniques were used to encourage the children to think. Whenever this kind of involvement occurred, the class atmosphere became more lively and less boring. Students appeared to be more attentive and enthusiastic, although we were not able to measure from the observations whether they were actually learning better. For example, in contrast to the case described above in which the teacher used an ETV in a not very effective manner, another teacher in a different school taught a very similar environmental protection topic also by using an ETV programme. However, in this case the ETV programme was cut into several short clips and embedded in a PowerPoint presentation. After showing a short clip for 2 to 3 minutes, the teacher posed some questions on the main theme for the class to discuss thoroughly and then moved on to the next clip. The whole class participated in the discussion actively. As the story of the ETV programme unfolded progressively in the several short clip sequences, the students seemed to have developed a firm understanding of the subject and appeared to be enthusiastic and motivated throughout the whole class period. These two contrasting cases illustrate that, with more or less the same hardware and software, and the same topic, the teaching effects can be very different depending on the pedagogical design.

In the secondary schools there were some cases observed in which the IT was used to achieve effects that could not have been achieved by other media. This suggests some interface between students learning from IT and beginning to learn the subject matter *with* IT. In one Integrated Science lesson the teacher used PowerPoint and video to stimulate the students' interest in space and explain how a water rocket works. After viewing the presentation the students were required to answer questions. In this case the IT was able to demonstrate the subject matter in a way that other media could not have done. Similarly, in a Mathematics lesson on trigonometry the teacher made use of a simulation to demonstrate the three-dimensional concepts so as to enable the students to understand the abstract concepts more easily. In another observed lesson the teacher used computer animation to illustrate the concept of gene forming, growing and spreading in a Biology lesson. This appeared to enhance the students' understanding.

Learning from IT

As mentioned above, learning from IT involves the use of activities that require students to learn from technology-based resources or materials such as web-based resources, computer simulations or other computer-based learning software or programs. Most of them involved the students in hands-on activities.

Of the 15 lessons observed in the primary schools in which the whole class had access to computers, most of them involved the pupils engaging in information searching activities on the Internet. However, in many cases, there has been a lack of clear purpose and minimal teacher guidance about what to look for or how to use the information obtained when it has been found. In some English classes the pupils were observed reading and listening to stories, but again they were left much to their own devices with little teacher facilitation to encourage any particular focus or thinking about what they were doing.

An example of students interacting with computers and each other at secondary level was a class in which the students worked on a web-based self-learning platform to answer some multiple-choice questions to revise the basic concept of Chinese grammar. It appeared that the students were interested in the exercises and the participation level was high. The students engaged in active discussion about the answers to the questions. The teacher then explained the results and answers and was able to ask those students who had mistakes to re-do those questions.

One of the observed secondary school teachers made good incidental use of IT to obtain up-to-date information. This was in a Religious Studies class. One of the students raised a question about racial discrimination in Hong Kong and a quick search on the Internet by the teacher found a suitable video clip to address the question.

Learning with IT

There were some cases observed at both primary and secondary school levels in which the students appeared to be using the IT as a tool to facilitate learning about some subject matter, such as using the software to create or compose, as a basis for peer review and critique or for searching for information.

In the primary schools there were three cases where children were involved in using the technology as a tool to facilitate learning. In one of these cases the class was using Word to create poems which they then shared and discussed with their peers. After they had done this the teacher reviewed the use of the software “Print Image”, a DIY artwork software package, and then showed his own product to the whole class. He pointed out to the students the design features he wanted them to be aware of. After that, the students designed their own greeting cards by creating their own pictures or choosing their favourites from the sample and incorporating the poems they had written. Another example of student engagement at the primary school level was a case in which the teacher used IT to promote instant sharing between peers of their work. In this case, the teacher used some special control software to select some students’ work for display on the LCD projector so that the whole class could read (and hence share) the writing done by some of their classmates. In the third example, the class provided survey data about their means of transport to school, then used Excel to create graphs to represent these data. The teacher showed them how they could create different types of graphs using Excel and some students tried representing their data in different graph formats.

In the secondary schools there were a few good examples of students learning with IT. These mostly involved the use of the IT as a means to facilitate student-centred learning which often occurred in small groups of students sharing a computer. One example was in the Design and Technology area, in which students were divided into groups, with each group sharing a computer to do 3-D modelling and design. Another class was observed working in groups of 4 to collect information and prepare a PowerPoint presentation, with each group’s presentation contributing a part of the topic to be covered in the lesson. One teacher of a Form 6 English class used a video of the previous students’ oral presentations and asked the students to critique them according to a set of given criteria.

One school reported, during the School Visit, a QEF-funded Science project with the objective of building a collaborative learning environment for students (using IT) that would facilitate the development of student interest in science and technology, project-based learning, ability to use IT for self-learning, teamwork and communication skills, and higher order thinking and creative problem solving abilities. This project involved some specially designed projects (e.g., to design a sewage treatment plant), with different students taking on different roles in the group, such as engineers and government officers, to simulate the process of building a sewage treatment plant.

Other uses of IT for improving student learning

There were some cases reported in the teachers’ focus group interviews of innovative use being made of IT for assessment and communication. One teacher had set up a webpage where he would share syllabuses, markers’ reports and teaching materials for the students to download. He had also tried to collect assignments via email but he found that this was problematic because students sometimes claimed they had already submitted their work and there was no way for him to verify whether this was true. He also found it difficult to mark assignments electronically because this required a lot of typing and he was not skilful in Chinese input. In another example, a school had obtained QEF funding to set up students’ Chinese compositions on the Web as a means of encouraging the students to read and write. Another school keeps electronic portfolios of students’ good class work, which is presented to them when they graduate.

Summary and discussion

From the examples described above, a number of general observations can be made:

- Much of the IT-related activity that was observed was teacher-centred, in the sense that the teachers controlled the directions and flow of the lesson, Ÿ Students' motivation and interest is not necessarily a direct consequence of the IT use but rather comes from carefully designed teaching and learning activities that require students to interact with materials, media, teachers or peers,

Ÿ The successful use of IT to facilitate teaching and learning across the curriculum is not necessarily related to either the extent or the nature of its use, but rather to the appropriateness and effectiveness of the pedagogical design and execution. The use of IT as a presentation tool for expository teaching alone is teacher-centred. However, as the examples described above illustrate, the use of IT as a presentation tool does not necessarily imply teacher-centredness or lower level thinking, if it is an integrated part of a holistic instructional strategy augmented by other activities that stimulate students to interact and think,

Ÿ There is still little evidence that teachers are taking a constructivist approach in terms of using IT to encourage students to construct knowledge based on discussion and collaborative activity. There is little evidence of technology being used to promote interactive learning processes or tasks requiring higher-order thinking skills in primary schools, either through software used in the classroom or through the use of the Internet or school intranet, although this may also reflect the broader pedagogical situation rather than the specific pedagogic use of IT. This lack of use is despite the fact that the EMB Document analysis has revealed that a large amount of software and other resources has been developed by the EMB, Curriculum Development Institute and other providers in Hong Kong. Among other things, these resources include interactive games and other materials to promote higher order thinking, support for curriculum planning and assessment, learning packages designed to raise computer awareness, and a wide range of teaching packages and curriculum support materials for different teaching areas.

8.2 Further analyses of the quantitative data

Correlational analyses were performed to examine the relationships between major constructs such as school, school head, teacher, student and family factors that may have impact on teachers' pedagogical practices and students' learning outcomes.

The procedures and methods of the analyses were as follows:

1. The key constructs affecting teachers' pedagogical use of IT and students' learning outcomes were identified according to the literature review and the Theoretical Framework presented in Chapters 2 and 3 respectively,
2. Questionnaire items pertinent to the constructs were then identified from the instruments sets of this Study as measures of the corresponding constructs,
3. Where multiple items/sub-items were involved, the construct was measured by a composite score derived in the following manner:
   i. Factor analysis was performed on the items/sub-items, of the combined datasets of primary and secondary school sectors, to determine if there were any identifiable underlying dimensions. The purpose of this was to summarise the items or sub-items with a fewer number of factors. The primary and secondary data were grouped together because of the need to use the same core methodology and common constructs that are uniform across the two school sectors.
   ii. The factor structures generated were examined and the underlying factors were identified and interpreted according to the factor loadings of the items/sub-items.
   iii. Items/sub-items that loaded significantly on the factor that represented the relevant construct of interest were then combined to form a composite score.
   iv. The reliability coefficients (Cronbach's alphas) of the composite scores were estimated to establish the internal consistency of the measures.
4. To enable analyses across measures from different instruments to be performed, the school-averaged scores of the measures were computed,
5. Finally, the Spearman's rank order correlations were estimated to determine if there were significant relationships between the various constructs.

Results of the factor analyses of the various items for the combined datasets of primary and secondary school sectors are shown in Tables 1 – 3 in Appendix XV.

The constructs included in the correlational analyses and their measurements are summarised in Table 8.3. It should be noted that the Cronbach's alpha coefficients for two constructs, namely school engagement in activities for promoting IT culture in school (H10-2) and teachers' beliefs about ITEd: enhancing teaching effectiveness (T11-1), are relatively lower and should hence be interpreted with caution.

Table 8.3: Constructs included in the correlational analyses and their measurements

Construct	Variable Name	Measurement	Source	Reliability
School Heads' perception of role of ITEd	H9a	Sum of H9a (1) to (9)	School Heads' Questionnaire	.86
School engagement in activities for promoting IT culture in school	H10-2	Sum of H10 (a) and (i)	School Heads' Questionnaire	.40
Teachers' IT competence:				
Proportion of teachers at IT Adoption stage 4 or above	T1g (R)	T1g recoded into ratio of number of teachers at stage 4 or above to total number of teachers in school	Teachers' Questionnaire	NA
Teachers' IT competence: basic generic software	T13-1	Sum of T13 (a) (b) (d) (e) (l) (n)	Teachers' Questionnaire	.87
Teachers' IT competence: advanced specific software	T13-2	Sum of T13 (c), (f) to (k), (m)	Teachers' Questionnaire	.92
Teachers' IT competence: apply IT in curriculum	T13o	T13 (o)	Teachers' Questionnaire	NA
School IT resources and support: Sufficiency of networking perceived by teachers	T2b1	T2b1	Teachers' Questionnaire	NA
Sufficiency of hardware perceived by teachers	T2b2	T2b2	Teachers' Questionnaire	NA
Sufficiency of software perceived by teachers	T2b3	T2b3	Teachers' Questionnaire	NA
Sufficiency of technical support perceived by teachers	T2b4	T2b4	Teachers' Questionnaire	NA
Sufficiency of curriculum support perceived by teachers	T2b5	T2b5	Teachers' Questionnaire	NA
Sufficiency of online application platform perceived by teachers	T2b6	T2b6	Teachers' Questionnaire	NA
Teachers' pedagogical use of IT:				
Teachers encouraging or requesting student to use IT for learning	T10	Sum of T10 (a) to (k)	Teachers' Questionnaire	.89
Student-centredness in classroom teaching	T14d-1	T14d (2) to (5), and (7)	Teachers' Questionnaire	.75

Construct	Variable Name	Measurement	Source	Reliability
Teachers beliefs: Teachers' beliefs about ITEd: enhancing teaching effectiveness	T11-1	Sum of T11 (a) and (b)	Teachers' Questionnaire	.58
Teachers' beliefs about ITEd: strengthening communication and collaboration	T11-2	Sum of T11 (c) to (f)	Teachers' Questionnaire	.87
Teachers' beliefs about ITEd: benefiting individual students	T11-3	Sum of T11 (g) to (j)	Teachers' Questionnaire	.84
Students' home ownership of computers	RS1	S1	Students' Questionnaire	NA
Students' time spent on using computer for learning in school	S3	S3	Students' Questionnaire	NA
Sufficiency of IT resources and support in school perceived by students	S5	Sum of S5 (a) to (e)	Students' Questionnaire	.73
Students' liking for teachers' use of IT in teaching	S9	S9	Students' Questionnaire	NA
Students' time spent on IT for learning outside school hours	S17-1	Sum of S17 (a) to (d) and (f)	Students' Questionnaire	.76
Students' time spent on IT for communication/entertainment outside school hours	S17-2	Sum of S17 (e), and (g) to (i)	Students' Questionnaire	.77
Students' IT learning outcomes: Students' IT competence	S20 and 21	Sum of S20 (a) to h) and S21 (a) to (e)	Students' Questionnaire	.90
Students' perception of positive impact of IT on them	S27-1	Sum of S27 (a) to (f) and (j) to (n)	Students' Questionnaire	.87
Students' confidence in IT use	S30	S30	Students' Questionnaire	NA
Students' IT literacy (generic competence for learning)	P2-19	ITLA Part II, item 19	ITLA	NA
Students' IT literacy (generic competence for solving daily problems)	P2-20	ITLA Part II, item 20	ITLA	NA
Students' IT literacy (technical knowledge and skills)	Pscore	ITLA Part I score	ITLA	NA
Parents' willingness to support their child's development of IT knowledge and skills	P10	P10	Parents' Questionnaire	NA

8.3 Results for the primary school sector

Table 8.4 shows the Spearman's rank order correlation coefficients computed for the selected constructs for the Primary School Sector. The inter-correlations between the key constructs and teachers' pedagogical uses of IT (as defined in Table 8.3) and student learning (as defined in Table 8.3) for the Primary School Sector are illustrated diagrammatically in Figures 8.1 and 8.2.

From Table 8.4 and Figures 8.1 and 8.2, it can be observed that complex inter-relationships exist between teachers' pedagogical uses of IT, students' learning outcomes, and a variety of school, teacher, parent and student factors. It should be noted that in the figures the thick solid lines represent significant positive correlations with correlation coefficient r ≥ 0.3 that exist between constructs or, for constructs with multiple variables, between more than two-thirds of the pairs of correlations. The thin solid lines represent significant positive correlations with r values < 0.3. Similarly, the thick broken lines represent significant negative correlations with r values ≤ –0.3, and the thin broken lines represent significant negative correlations with r values > –0.3 but < 0.

Most of the significant correlations between constructs are rather weak, although, policy-wise they do give rise to some interesting observations that will be discussed below. It should be noted that Figures 8.1 and 8.2 are intended to give an overview of inter-correlations between variables and should not be interpreted independently of Table 8.4. It should also be emphasised that the lines in Figures 8.1 and 8.2 are indicators of the correlations that are the most relevant to the research questions and are not meant to imply any cause and effect relationships. Furthermore, the main interest here is in the general patterns for groups of constructs, as defined in Table 8.3, rather than particular one-to-one correlations of specific variables as shown in Tables 8.4 and 8.5. In cases where only one variable among several in a construct correlated with another construct, we have not included these in the following description.

Factors related to teachers' pedagogical practices:

- A significant positive correlation exists between teachers' pedagogical practice of encouraging/requesting students to use IT in learning tasks and the degree of student-centredness in classroom teaching.

- Teachers' pedagogical practice of encouraging/requesting students to use IT in learning tasks is also positively correlated with teachers' IT competence, their beliefs about ITEd, school engagement in activities for promoting an IT culture in school, and School IT resources and support.

- Student-centredness of the teachers in their classroom teaching correlates positively with their IT competence, their beliefs about ITEd, and school IT resources and support.

- Teachers' IT competence is associated with their beliefs about ITEd. Two of the three variables of teachers' beliefs about ITEd are positively correlated with school heads' beliefs/roles. Three of the four variables of teachers' IT competence correlate significantly with school heads' beliefs/roles. Teachers' IT competence and teachers' beliefs about ITEd are both correlated positively with school IT resources and support.

- While school heads' beliefs/roles do not have any direct relationship with teachers' pedagogical practices, they have significant positive correlations with school engagement in the promotion of an IT culture in school, four of the six variables of school IT resources and support, and, as mentioned about, most of the variables of teachers' IT competence and beliefs. The findings provide support to the observation reported in earlier chapters that school heads have a significant role in IT implementation that influences the school IT culture.

Factors related to student learning:

- Positive inter-correlations exist between students' self-perceived IT competence, their IT Literacy in terms of technological knowledge and skills, their IT Literacy in terms of generic skills in using IT for learning and for solving daily problems and their confidence in use of IT. Students' perceptions of the positive impact of IT on themselves correlates with their self-perceived IT competence, IT literacy in terms of generic skills in using IT for learning, and students' confidence in the use of IT. This provides some support for the validity of the various outcome measures.

- Most of the students' learning outcome variables have relationships with their use of IT for learning-related tasks outside school hours (four out of the six student learning outcome variables are significantly correlated with this), home ownership of computers (five out of the six student learning outcome variables are significantly correlated with this) and students' perception of the sufficiency of IT resources and support in school (four of the six student learning outcome variables are significantly correlated with this). Half of the student learning outcome variables correlate significantly with teachers' pedagogical practice of encouraging/requesting students' use of IT in learning-related tasks and two of the six variables correlate with students' liking for the teacher's use of IT in teaching. Student confidence correlates negatively with students' use of IT for communication and entertainment outside school hours. No significant correlation has been found between students' use of IT for learning in school and their learning outcome variables.

- Other factors having a significant positive correlation with one or two of the student learning outcome variables include IT resources and support in school, students' liking for teachers' use of IT in teaching, school engagement in activities for promoting an IT culture in school, school heads' beliefs/roles and parents' willingness to support the development of IT knowledge and skills of their children. But their correlations with the student learning outcome variables are generally rather weak.

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- Only a few single-variable relationships have been found between student learning outcome and the other teacher factors such as teachers' beliefs and teachers' IT competence. No direct relationships have been found between student learning outcome variables and teachers' self-reported degree of student-centreness in their classroom teaching.

- Students' use of IT for learning outside school hours (also mentioned above as a variable having relationships with student learning outcomes) is related with students' home ownership of computers, time spent by students using computers for learning in school, students' time spent on IT for communication/entertainment outside school hour, teachers' encouragement/request for their use of IT for learning-related tasks, and school engagement in activities for promoting an IT culture in school. It is also correlated significantly with school heads' beliefs/roles, with the IT resources and support variable, "sufficiency of online application platform perceived by teachers" and the variable of teachers' beliefs about ITEd, "teachers' beliefs about ITEd: strengthening communication and collaboration".

- Parents' willingness to support their child's development of IT knowledge and skills is related to two of the six variables of student learning outcomes: "students' IT competence" and "students' confidence in IT use".

<u>Factors relating to school and wider community IT culture</u>

- Students' home ownership of computers has positive correlations with school engagement in promoting IT culture in the school, school IT resources (three of the six variables), teachers' beliefs about ITEd, students' perceptions about the sufficiency of IT resources and support in school and parents' willingness to support the development of their children's IT knowledge and skills.

- Students' perceptions about the sufficiency of IT resources and support in school correlates positively with school IT resources (five of the six variables), teachers encouraging or requesting students to use IT for learning, students liking for teachers' use of IT in teaching. This construct has a negative correlation with time spent by students on using IT for learning outside school hours.

- Students' liking for teachers' use of IT in teaching has a positive correlation with school IT resources (three of the six variables) and with students' time spent on using computers for learning in school.

Table 8.4: Spearman's correlations between school-level measures (Primary School Sector)

Variables	H9a	H10-2	T1g(R)	T2b1	T2b2	T2b3	T2b4	T2b5	T2b6	T10	T11-1	T11-2	T11-3	T13-1	T13-2	T13o	T14d-1	RS1	S3	S5	S9	S17-1	S17-2	S20 and 21	S27-1	S30	P2-19	P2-20	Pscore	P10
Mean	28.72	4.61	0.73`	2.83	2.57	2.48	2.67	2.32	2.32	15.94	5.58	9.80	10.98	17.98	17.02	2.60	13.16	0.86	1.14	6.38	3.28	2.53	2.99	27.61	29.42	2.70	2.45	1.93	16.39	2.66
SD	3.83	0.98	0.12	0.30	0.33	0.33	0.36	0.37	0.47	2.58	0.32	0.77	0.65	1.22	1.84	0.26	0.92	0.11	0.28	0.61	0.23	0.55	0.70	3.76	1.83	0.27	0.49	0.54	1.93	0.35
Valid N	120	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	124	123
H9a	1.000																													
H10-2	0.293*	1.000																												
T1g(R)	0.159	0.055	1.000																											
T2b1	0.201*	0.201*	0.374*	1.000																										
T2b2	0.178	0.093	0.357*	0.881*	1.000																									
T2b3	0.104	0.020	0.359*	0.798*	0.918*	1.000																								
T2b4	0.212*	0.059	0.419*	0.758*	0.787*	0.783*	1.000																							
T2b5	0.186*	0.048	0.420*	0.738*	0.814*	0.848*	0.847*	1.000																						
T2b6	0.182*	0.096	0.275*	0.699*	0.741*	0.791*	0.654*	0.765*	1.000																					
T10	0.116	0.239*	0.246*	0.315*	0.396*	0.385*	0.277*	0.373*	0.471*	1.000																				
T11-1	0.224*	0.042	0.359*	0.444*	0.530*	0.501*	0.428*	0.442*	0.388*	0.332*	1.000																			
T11-2	0.098	0.136	0.246*	0.224*	0.290*	0.299*	0.331*	0.382*	0.309*	0.537*	0.402*	1.000																		
T11-3	0.224*	0.180*	0.395*	0.358*	0.417*	0.385*	0.421*	0.392*	0.259*	0.371*	0.619*	0.451*	1.000																	
T13-1	0.225*	0.074	0.651*	0.379*	0.390*	0.402*	0.362*	0.419*	0.365*	0.360*	0.372*	0.333*	0.332*	1.000																
T13-2	0.200*	-0.009	0.526*	0.241*	0.282*	0.320*	0.271*	0.338*	0.307*	0.379*	0.249*	0.346*	0.206*	0.774*	1.000															
T13o	0.210*	0.172	0.626*	0.461*	0.440*	0.451*	0.378*	0.490*	0.432*	0.372*	0.476*	0.350*	0.341*	0.829*	0.737*	1.000														
T14d-1	0.137	0.054	0.232*	0.304*	0.319*	0.333*	0.344*	0.394*	0.338*	0.428*	0.280*	0.424*	0.362*	0.372*	0.504*	0.429*	1.000													
RS1	0.145	0.230*	0.155	0.142	0.219*	0.219*	0.143	0.124	0.219*	0.180*	0.308*	0.188*	0.227*	0.144	-0.049	0.154	0.030	1.000												
S3	0.022	0.094	0.163	0.103	0.090	0.079	0.105	0.100	0.103	0.035	0.085	0.058	0.117	0.091	0.087	0.138	0.057	0.127	1.000											
S5	0.046	0.098	0.123	0.196*	0.290*	0.280*	0.147	0.203*	0.253*	0.243*	0.169	0.130	0.057	0.143	0.055	0.154	0.050	0.310*	0.194*	1.000										
S9	0.040	-0.072	0.134	0.094	0.135	0.224*	0.157	0.200*	0.181*	0.067	0.143	0.138	0.002	0.106	0.193*	0.157	0.168	0.107	0.238*	0.286*	1.000									
S17-1	0.206*	0.246*	0.120	0.100	0.106	0.061	0.086	0.148	0.208*	0.374*	0.118	0.298*	0.140	0.130	0.115	0.183*	0.113	0.191*	0.295*	0.153	0.008	1.000								
S17-2	0.029	0.092	-0.123	-0.133	-0.105	-0.106	-0.094	-0.039	-0.048	-0.043	-0.028	0.149	-0.027	-0.040	0.069	-0.012	0.030	-0.026	0.131	-0.281*	-0.125	0.314*	1.000							
S20and21	0.026	0.192*	0.284*	0.078	0.097	0.149	0.099	0.118	0.270*	0.251*	0.093	0.243*	0.133	0.103	0.021	0.164	0.013	0.477*	0.135	0.250*	0.123	0.424*	0.095	1.000						
S27-1	0.070	0.073	0.098	0.066	0.052	0.105	0.008	0.048	0.099	0.204*	0.041	0.122	0.015	-0.042	0.038	0.034	-0.053	0.130	0.159	0.279*	0.394*	0.229*	0.012	0.385*	1.000					
S30	0.066	0.167	0.091	0.105	0.128	0.107	0.057	0.054	0.200*	0.182*	0.139	0.114	0.062	-0.006	-0.121	0.074	-0.101	0.471*	0.146	0.320*	0.204*	0.234*	-0.182*	0.502*	0.456*	1.000				
P2-19	0.014	0.137	0.110	-0.016	-0.013	0.006	-0.036	0.000	0.073	0.065	-0.114	0.099	-0.081	0.078	0.119	0.081	0.049	0.323*	0.158	0.088	0.062	0.171	0.143	0.402*	0.214*	0.283*	1.000			
P2-20	0.121	0.163	0.170	-0.040	-0.004	0.016	0.021	0.085	0.176	0.141	-0.086	0.130	-0.061	0.112	0.195*	0.151	0.080	0.215*	0.057	0.098	0.099	0.201*	-0.044	0.346*	0.132	0.276*	0.636*	1.000		
Pscore	0.191*	0.114	0.153	0.044	0.089	0.047	0.090	0.072	0.140	0.129	0.131	0.096	0.032	-0.001	-0.045	0.021	-0.019	0.349*	-0.062	0.182*	0.063	0.177	-0.146	0.312*	0.147	0.440*	0.291*	0.239*	1.000	
P10	-0.041	-0.155	-0.010	0.002	0.061	0.034	-0.011	-0.045	-0.023	-0.005	0.144	0.126	0.064	-0.129	-0.185*	-0.092	-0.140	0.279*	-0.128	0.096	-0.015	-0.015	-0.004	0.204*	0.101	0.211*	-0.022	0.036	0.077	1.000

* Statistically significant at .05 level (two-tailed)

Key to variables:

H9a	School Heads’ perception of role of ITEd
H10-2	School engagement in activities for promoting IT culture in school
T1g(R)	Proportion of teachers at IT Adoption stage 4 or above
T2b1	Sufficiency of networking perceived by teachers
T2b2	Sufficiency of hardware perceived by teachers
T2b3	Sufficiency of software perceived by teachers
T2b4	Sufficiency of technical support perceived by teachers
T2b5	Sufficiency of curriculum support perceived by teachers
T2b6	Sufficiency of online application platform perceived by teachers
T10	Teachers encouraging or requesting student to use IT for learning
T11-1	Teachers’ beliefs about ITEd: enhancing teaching effectiveness
T11-2	Teachers’ beliefs about ITEd: strengthening communication and collaboration
T11-3	Teachers’ beliefs about ITEd: benefiting individual students
T13-1	Teachers’ IT competence: basic generic software
T13-2	Teachers’ IT competence: advanced specific software
T13o	Teachers’ IT competence: apply IT in curriculum
T14d-1	Student-centredness in classroom teaching
RS1	Students’ home ownership of computers
S3	Students’ time spent on using computer for learning in school
S5	Sufficiency of IT resources and support in school perceived by students
S9	Students’ liking for teachers’ use of IT in teaching
S17-1	Students’ time spent on IT for learning outside school hours
S17-2	Students’ time spent on IT for communication/entertainment outside school hours
S20and21	Students’ self-perceived IT competence (hardware and software skills)
S27-1	Students’ perception of positive impact of IT on them
S30	Students’ confidence in IT use
P2-19	Students’ IT literacy (generic competence for learning)
P2-20	Students’ IT literacy (generic competence for solving daily problems)
Pscore	Students’ IT literacy (technical knowledge and skills)
P10	Parents’ willingness to support their child’s development of IT knowledge and skills

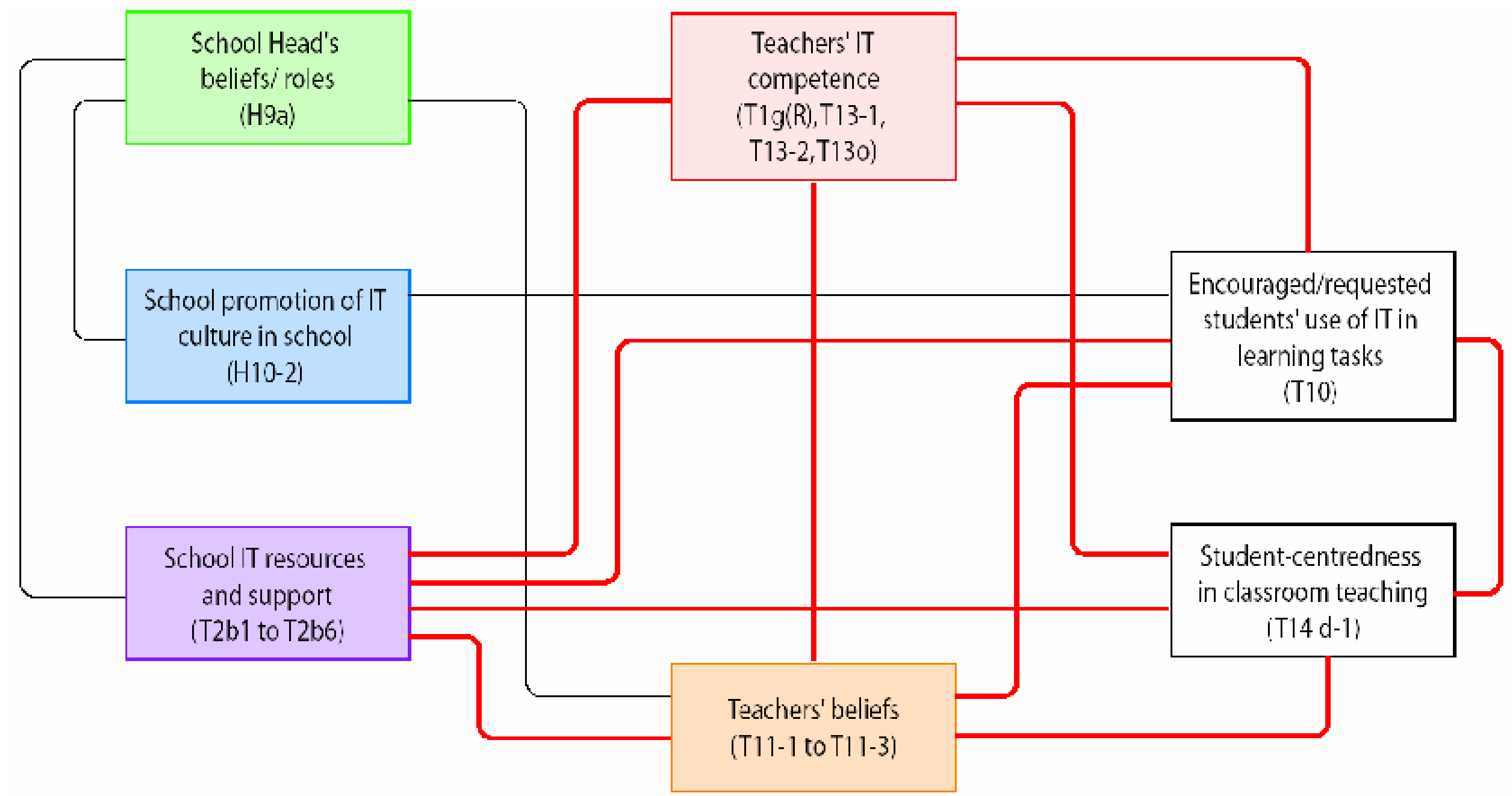

Figure 8.1: Simplified diagrammatic representation of the inter-correlations between teachers' pedagogical practice and school and teacher characteristics (Primary)

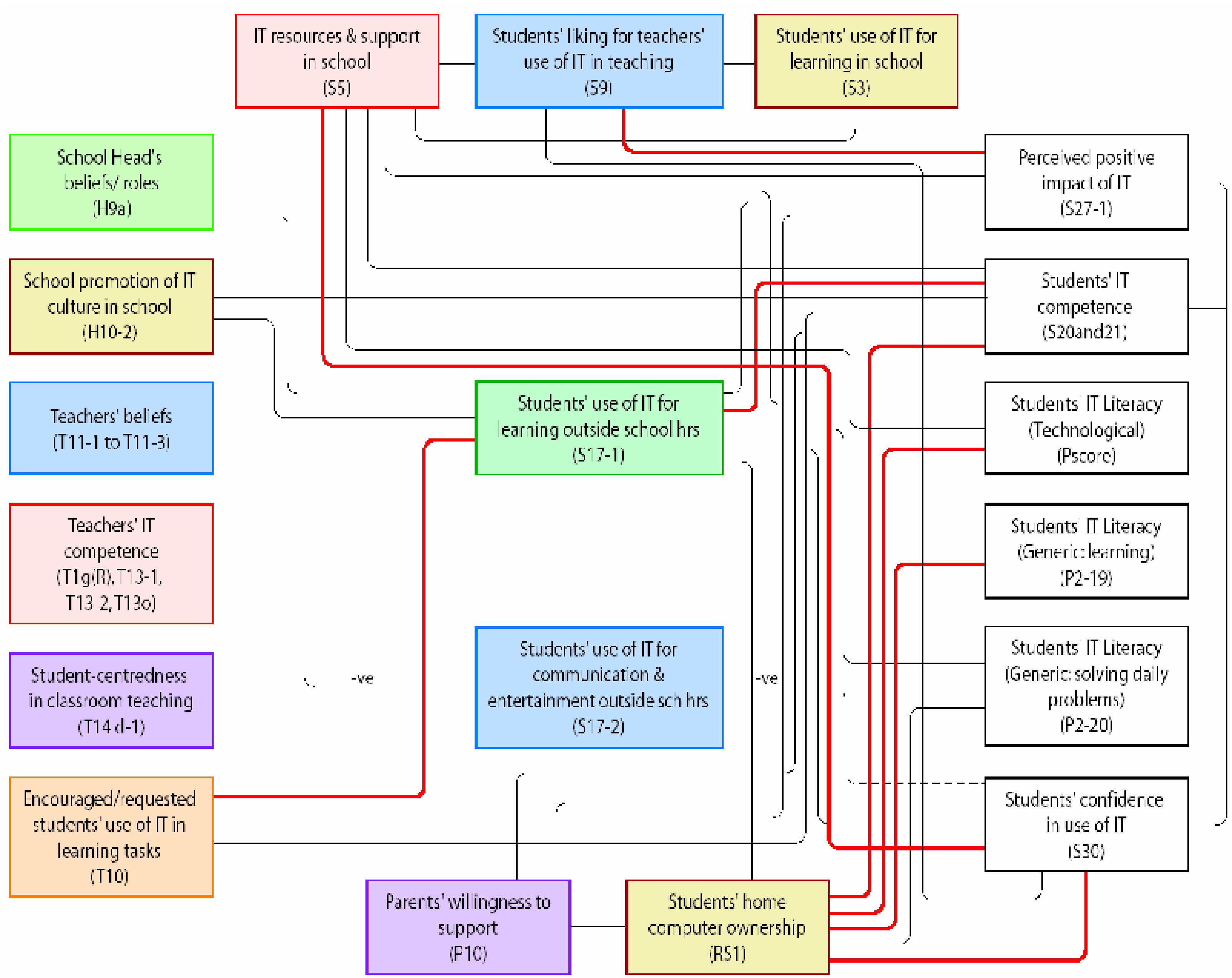

Figure 8.2: Simplified diagrammatic representation of the inter-correlations between students' learning outcomes and school, teacher, student and parent factors (Primary)

8.4 Results for the secondary school sector

Table 8.5 shows the Spearman's rank order correlation coefficients computed for the selected constructs for the Secondary School Sector. The inter-correlations between the key constructs and teachers' pedagogical uses of IT and student learning (as defined in Section 8.2) for the Secondary School Sector are illustrated diagrammatically in Figures 8.3 and 8.4.

It can be seen from Table 8.5 and Figures 8.3 and 8.4 that, similar to the situation of the Primary School Sector, complex inter-relationships exist between teachers' pedagogical uses of IT, student learning, and a variety of school, teacher, parent and student factors. Once again it should be noted that Figures 8.3 and 8.4 are intended to give an overview of inter-correlations between variables and should not be interpreted independently of Table 8.5. It should also be emphasised again that the lines in Figures 8.3 and 8.4 are indicators of correlations and are not meant to imply any cause and effect relationships. It should be noted that in the figures the thick solid lines represent significant positive correlations with correlation coefficient $r \geq 0.3$ that exist between constructs or, for constructs with multiple variables, between more than two-thirds of the pairs of correlations. The thin solid lines represent significant positive correlations with r values < 0.3. Similarly, the thick broken lines represent significant negative correlations with r values ≤ -0.3, and the thin broken lines represent significant negative correlations with r values > -0.3 but < 0.

In fact, the patterns of inter-correlations observed in the two school sectors are quite similar.

<u>Factors related to teachers' pedagogical practices:</u>

- A significant positive correlation exists between teachers' pedagogical uses of encouraging/ requesting students to use IT in learning tasks and the degree of student-centredness in classroom teaching.

- Teachers' pedagogical practice of encouraging/requesting students to use IT in learning tasks is also positively correlated with teachers' IT competence, their beliefs about ITEd, and five of the six variables of school IT resources and support.

- Student-centredness reported by the teachers in their classroom teaching correlates positively with two of the three variables of their beliefs about ITEd and the time students reported using computers for learning in school. There is no significant relationship between student-centredness in classroom teaching reported by teachers with any other school or teacher factors, except for one variable relating to teachers' IT competence.

- Teachers' IT competence is positively associated with their beliefs about ITEd and nearly all of the variables of school IT resources and support. As well, two of the four teachers' IT competence variables correlate with school heads' beliefs/roles. These are "teachers' IT competence with basic generic software" and "teachers' IT competence to apply IT in the curriculum".

- The school heads' beliefs/roles have a significant relationship to the school's engagement in the promotion of IT culture within the school and, as mentioned above, two of the four variables of teachers' IT competence. We do not see any significant relationship between school heads' beliefs/roles or school promotion of IT culture and other variables such as teachers' pedagogical practices.

- All of the variables of teachers' beliefs about IT intercorrelate with all of the variables of school IT resources and support, except for one case (teachers' beliefs about ITEd benefiting individual students does not correlate significantly with sufficiency of networking perceived by teachers).

Factors related to student learning:

- Again, positive inter-correlations exist between students' self-perceived IT competence, their IT Literacy in terms of technological knowledge and skills (which correlates with all other variables except with their perception of gain from ITEd), their IT Literacy in terms of generic skills in using IT for learning and for solving daily problems, their perception of gain from ITEd (positive impact of ITEd), and their confidence in use of IT. This provides some support for the validity of the various outcome measures.

- Teachers' beliefs about ITEd correlate significantly with only one student learning outcome variable, students' IT competence.

- Students' learning outcome variables have significant relationships with their use of IT for learning-related tasks outside school hours (five of the six learning outcome variables correlate with this) and home ownership of computers (also five of the six learning outcome variables correlate with this). Three of the six student learning outcome variables (IT literacy in terms of technological knowledge and skills and generic skills in using IT for learning and student confidence in IT use) have negative correlations with students' use of IT for communication and entertainment outside school hours.

- Other factors having a significant positive correlation with some of the student learning outcome variables include parents' willingness to support the development of IT knowledge and skills of their children, school heads' beliefs/roles, students' liking for teachers' use of IT in teaching, teachers' IT competence and pedagogical practices of encouraging/requesting students' use of IT for learning. These relationships, however, are not very strong.

- The only significant relationship with IT resources and support in school is for student IT competence, there being no direct relationship for any of the other student learning outcome variables. No significant relationships other than school heads' beliefs/roles mentioned above, have been found between student learning outcome variables and other school factors such as school engagement in activities for promoting an IT culture.

- Students' use of IT for learning outside school hours – mentioned above as a variable with a relationship to student learning outcomes – is also related to students' time spent on using computers for learning in school and to teacher factors including their beliefs (two of the three variables), their encouragement/request for their use of IT for learning-related tasks and the degree of student-centredness in their classroom teaching. It is also associated with the school heads' beliefs/roles with respect to ITEd.

- Students' liking for their teachers' use of IT correlates significantly with the time they spend using computers for learning in school.

- Students' self-perceived IT competence has a significant positive relationship with teachers' beliefs about ITEd.

Factors relating to school and wider community IT culture

- In the Secondary School Sector, students' home ownership has significant correlations with only two constructs, both of which have been mentioned earlier. These are student learning outcomes and parents' willingness to support the development of their child's IT knowledge and skills.

- Students' perceptions of the sufficiency of IT resources and support in school correlates significantly with school IT resources and support, time spent by students using computers for learning at school, and three of the four variables of teachers' IT competence.

- Time spent by students using computers for learning in school has a significant relationship to time spent using IT for communication and entertainment outside school hours. It is also positively related to the time they spend using IT for learning outside school hours.

- Parents' willingness to support their child's development of IT knowledge and skills correlates positively with home computer ownership reported by students and negatively with time spent by students using IT for communication/entertainment outside school hours.

Table 8.5: Spearman's correlations between school-level measures (Secondary School Sector)

Variables	H9a	H10-2	T1g(R)	T2b1	T2b2	T2b3	T2b4	T2b5	T2b6	T10	T11-1	T11-2	T11-3	T13-1	T13-2	T13o	T14d-1	RS1	S3	S5	S9	S17-1	S17-2	S20 and 21	S27-1	S30	P2-19	P2-20	Pscore	P10
Mean	28.35	4.62	0.75	2.93	2.58	2.38	2.64	2.08	2.32	15.79	5.49	9.35	10.18	18.14	16.11	2.50	12.52	0.98	1.13	5.35	2.56	3.25	5.48	32.11	28.63	2.50	2.80	2.72	17.35	2.52
SD	4.22	0.95	0.09	0.27	0.32	0.31	0.38	0.30	0.36	2.04	0.27	0.63	0.49	0.91	1.41	0.22	0.71	0.02	0.26	0.75	0.21	0.58	0.98	2.25	1.21	0.18	0.30	0.29	1.71	0.36
Valid N	113	119	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	125	125	125	125	125	125	125	125	125	123	123	123	118
H9a	1.000																													
H10-2	0.307*	1.000																												
T1g(R)	0.134	0.067	1.000																											
T2b1	0.028	0.007	0.503*	1.000																										
T2b2	0.087	0.006	0.461*	0.910*	1.000																									
T2b3	0.126	0.001	0.410*	0.837*	0.938*	1.000																								
T2b4	0.125	0.011	0.473*	0.818*	0.839*	0.836*	1.000																							
T2b5	0.143	0.017	0.378*	0.770*	0.821*	0.864*	0.845*	1.000																						
T2b6	0.167	0.067	0.409*	0.763*	0.773*	0.762*	0.730*	0.785*	1.000																					
T10	0.177	0.031	0.183*	0.148	0.242*	0.273*	0.186*	0.299*	0.451*	1.000																				
T11-1	0.091	-0.156	0.349*	0.360*	0.421*	0.413*	0.392*	0.388*	0.431*	0.446*	1.000																			
T11-2	0.157	-0.089	0.216*	0.191*	0.262*	0.291*	0.268*	0.319*	0.402*	0.681*	0.466*	1.000																		
T11-3	0.102	-0.119	0.240*	0.144	0.188*	0.232*	0.214*	0.289*	0.308*	0.552*	0.551*	0.653*	1.000																	
T13-1	0.193*	0.056	0.700*	0.358*	0.332*	0.303*	0.337*	0.279*	0.390*	0.252*	0.367*	0.248*	0.345*	1.000																
T13-2	0.070	0.028	0.299*	0.121	0.180*	0.225*	0.167	0.275*	0.250*	0.478*	0.230*	0.313*	0.402*	0.507*	1.000															
T13o	0.219*	0.066	0.506*	0.331*	0.373*	0.365*	0.406*	0.383*	0.448*	0.427*	0.439*	0.352*	0.365*	0.662*	0.591*	1.000														
T14d-1	0.139	0.042	-0.019	-0.055	0.025	0.099	0.078	0.122	0.101	0.370*	0.133	0.450*	0.422*	0.038	0.264*	0.128	1.000													
RS1	0.065	0.137	0.014	0.109	0.152	0.165	0.126	0.159	0.152	0.168	0.159	0.169	-0.018	-0.007	0.032	0.123	0.010	1.000												
S3	0.112	-0.017	0.038	0.016	0.030	0.014	0.042	0.037	-0.028	0.078	-0.022	0.118	0.176	0.133	0.081	0.051	0.229*	-0.145	1.000											
S5	0.137	0.048	0.280*	0.361*	0.351*	0.316*	0.320*	0.282*	0.318*	0.061	0.215*	-0.003	0.067	0.183*	0.074	0.299*	-0.037	0.122	0.258*	1.000										
S9	0.074	-0.091	0.167	0.092	0.040	0.053	0.079	0.078	0.033	-0.102	-0.047	0.064	-0.016	0.164	0.014	0.103	0.001	-0.021	0.192*	0.075	1.000									
S17-1	0.280*	0.060	-0.074	0.053	0.110	0.133	0.059	0.133	0.108	0.239*	0.220*	0.271*	0.172	-0.088	-0.092	0.132	0.288*	0.148	0.304*	0.102	0.058	1.000								
S17-2	-0.031	-0.064	-0.053	-0.117	-0.123	-0.037	-0.020	0.016	0.018	0.169	0.036	0.184*	0.083	0.130	0.212*	0.130	0.267*	-0.167	0.329*	-0.130	0.165	0.156	1.000							
S20and21	0.165	0.015	0.322*	0.248*	0.250*	0.236*	0.184*	0.219*	0.216*	0.277*	0.231*	0.181*	0.192*	0.228*	0.122	0.249*	0.039	0.382*	0.020	0.155	0.082	0.371*	-0.172	1.000						
S27-1	0.259*	0.018	0.041	0.047	0.052	0.075	0.061	0.081	0.038	-0.026	0.003	0.015	0.044	0.064	0.062	0.119	0.053	-0.028	0.260*	0.138	0.379*	0.289*	0.109	0.236*	1.000					
S30	0.224*	0.007	0.248*	0.123	0.100	0.103	0.126	0.123	0.096	0.188*	0.184*	0.111	0.124	0.209*	0.068	0.305*	0.020	0.223*	-0.020	0.068	0.198*	0.336*	-0.180*	0.665*	0.368*	1.000				
P2-19	0.221*	0.147	-0.019	0.047	0.055	0.067	0.044	0.021	0.043	0.064	0.043	0.053	-0.020	-0.054	-0.110	0.059	0.030	0.196*	-0.062	0.006	0.057	0.333*	-0.208*	0.388*	0.205*	0.382*	1.000			
P2-20	0.093	0.140	0.100	0.167	0.155	0.146	0.185*	0.090	0.138	0.084	0.046	0.022	0.047	-0.044	-0.084	0.098	0.124	0.231*	-0.046	0.030	-0.032	0.338*	-0.144	0.473*	0.196*	0.447*	0.607*	1.000		
Pscore	0.007	0.068	0.155	0.144	0.117	0.111	0.103	0.078	0.114	0.055	0.114	-0.018	0.061	0.043	-0.098	0.113	-0.096	0.299*	-0.206*	0.167	-0.135	0.127	-0.450*	0.401*	-0.035	0.353*	0.319*	0.398*	1.000	
P10	0.079	0.118	0.132	0.131	0.127	0.111	0.088	0.151	0.134	0.103	0.037	0.139	0.013	0.102	-0.009	0.131	-0.037	0.333*	-0.135	0.031	0.124	0.113	-0.235*	0.335*	0.157	0.259*	0.053	0.160	0.192*	1.000

* Statistically significant at .05 level (two-tailed)

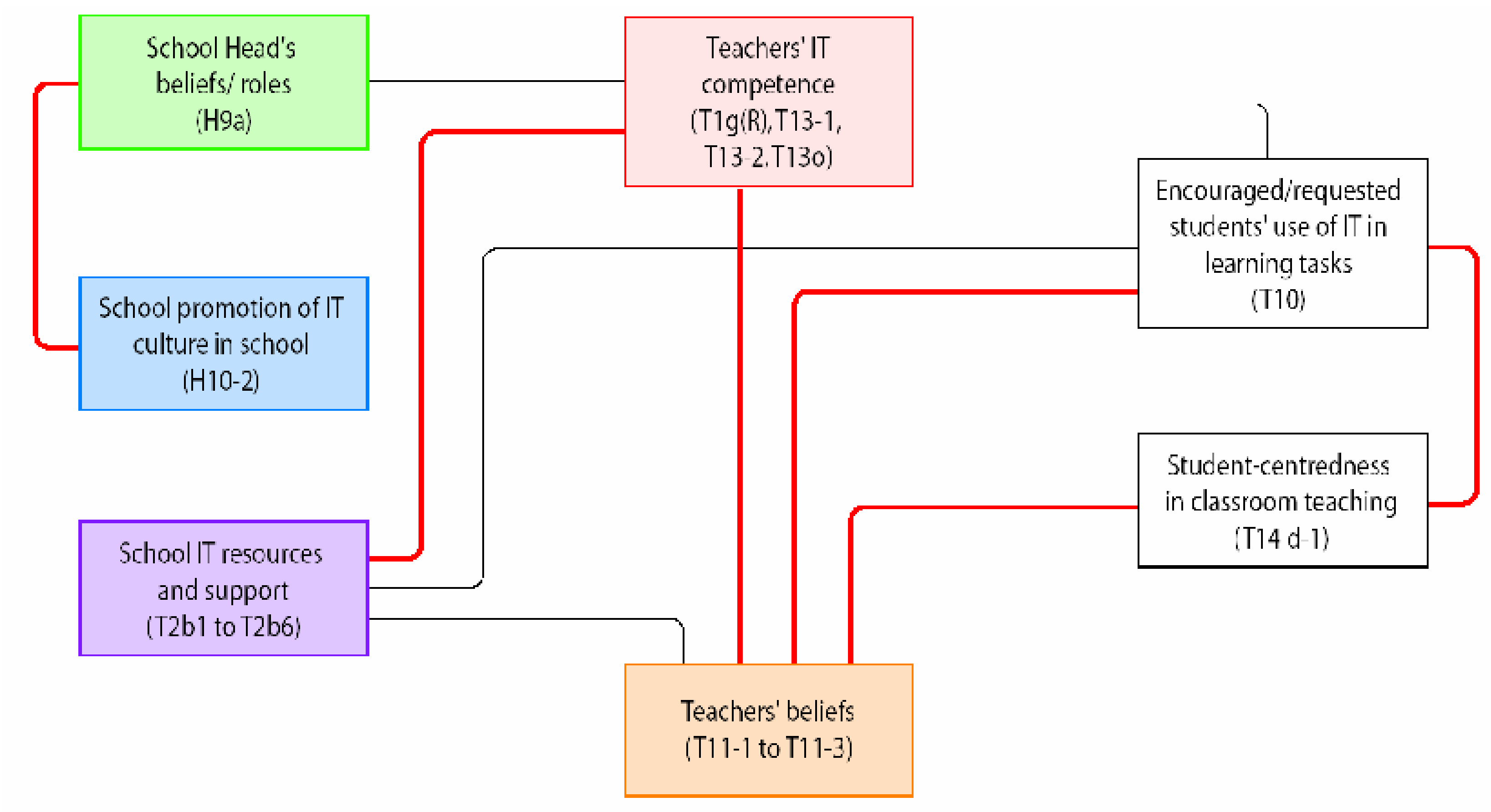

Figure 8.3: Simplified diagrammatic representation of the inter-correlations between teachers' pedagogical practice and school and teacher characteristics (Secondary)

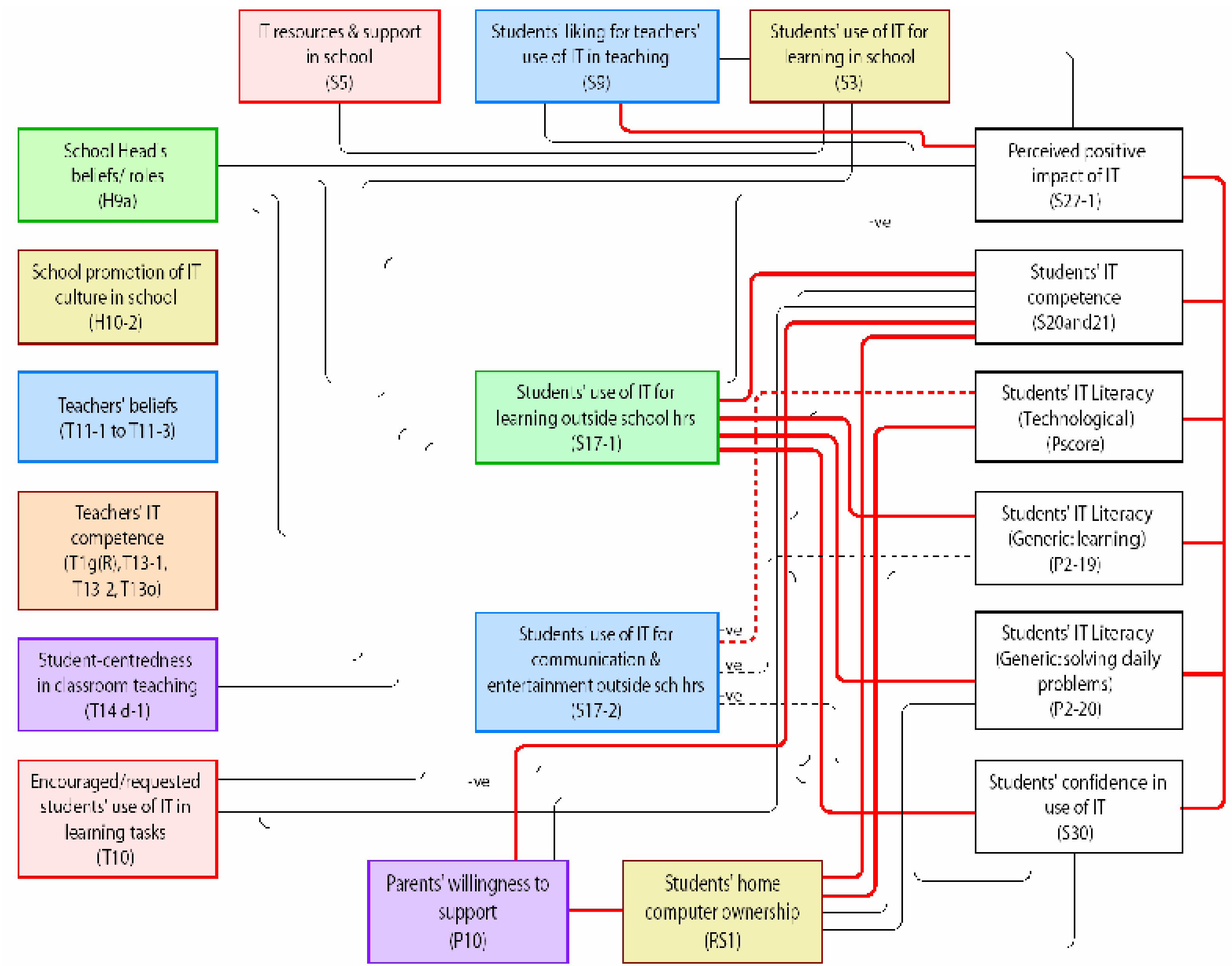

Figure 8.4: Simplified diagrammatic representation of the inter-correlations between students' learning outcomes and school, teacher, student and parent factors (Secondary)

8.5 General observations

As mentioned above, even though the significant correlations reported here were mostly rather weak, from a policy point of view there are some observations that are worth noting. However, it must be emphasised that correlation is not causation. The associations between the various constructs identified above are not evidences of cause-and-effect relationships between teachers' pedagogical uses of IT, students' learning outcomes and other school, teacher, parent and student factors.

The correlations among variables imply that student learning with IT is a complicated issue dependent upon many factors that integrate with each other, therefore attempts to measure student learning outcomes require systematic and holistic approaches above and beyond providing more computers and more training. The issue of home ownership is, nevertheless, important and has implications for policy. The pattern of relationships revealed in the analyses above clearly suggest that students' access to computers at home (outside school hours), teachers' pedagogical practice of encouraging/requesting students to use IT for learning-related tasks, parents' willingness to support the development of their children's IT knowlege and skills, and students' use of IT for learning outside school hours are important process variables related to student learning outcomes. The findings suggest that it is students' use of IT rather than teachers' use that may have the strongest impact on student learning, and this has prominent implications for future ITEd strategy.

Chapter 9 Findings from Special School Sector

This chapter reports the findings for the Special School School Sector, adopting a similar framework for analysis as in Chapters 6 and 7 for the Primary and Secondary School Sectors. It draws upon the descriptive data from the range of questionnaire surveys and the observations collected from the qualitative instruments that address the following aspects of the ITEd initiatives for this sector:

§ Access, connectivity and usage
§ Teacher enablement
§ Curriculum, pedagogy and resource support
§ School and wider community culture, and
§ Student learning.

Where the data have shown evidence of different patterns across the eleven school types in the Special School Sector, these have been discussed in the appropriate sections. The relevant tables have been appended at the end of each section.

9.1 Access, connectivity and usage

This section examines the extent and nature of access to and usage of IT in the surveyed special schools and the staff members' and students' homes. It begins with a breakdown of the numbers and locations in schools of hardware and the extent and nature of connectivity in schools. It also reports the expenditure patterns of school-based IT budgets. This section also looks into Access and Connectivity at home and finally examines general usage patterns of special school heads, teachers, specialists/therapists, parents and students.

9.1.1 Access to school IT facilities

Quantity and locations of hardware

Table 9.1 gives an overview of the mean numbers of different types of hardware in special schools, obtained from the School IT Survey Item 2a.

Table 9.1: Quantity of hardware (School IT Survey, Q. 2a)

Item	Mean	SD
Desktop computers	59.0	32.5
Notebook computers	12.0	12.8
Server machines	4.1	2.3
Application servers	4.6	2.0
Wireless LAN	0.7	1.5
Video Capture Encoding System	1.7	1.5
Video Conferencing System	0.6	2.0
Digital camera	3.0	3.5
Voice input/recognition system	1.3	7.0
Video broadcasting system	0.1	0.4
Digital Camcorder	1.8	1.5
Electronic musical instrument	1.2	2.3
Visualisers	1.2	1.5
Color Laser Printers	1.3	1.2
Bar code scanner	1.0	1.5
CD-RW	7.9	8.0
DVD-writers	0.4	1.8
LCD Monitors	4.6	6.1
Smart card reader	1.0	3.8

Note: N = 66

The average numbers of 71 computers (59 desktop computers and 12 notebook computers) in the special schools is higher than the average of 56.2 desktop computers and 4.4 notebook computers per special school reported in the Preliminary Study.

Table 9.2: Distribution of schools with respect to total number of computers

Total number of computers in school	Number of schools	%
≥ 160	2	3.0
120 – <160	7	10.6
80 – <120	8	12.1
40 – <80	41	62.1
< 40	8	12.1
Total	66	100

The highest number of computers in one school is 170. As can be seen in Table 9.2, 62.1% of the schools have 40 to less than 80 computers, 12.1% have 80 to less than 120, and a further 10.6% have 120 to less than 160 computers. Two schools (3%) reported having 160 computers or more and eight (12.1%) reported having less than 40.

The quantity of some IT hardware other than PCs and notebooks in special schools (Table 9.1) has also increased since the Preliminary Study. For example, the average number of CD-writers is 7.9 compared to the figure of 2.9 reported for special schools in the Preliminary Study.

Table 9.3: Distribution of schools with respect to student-computer ratios

Student-computer ratio	Number of schools	%
8 – <12	3	4.6
4 – <8	15	23.1
< 4	47	72.3
Total	65	100

The average ratio of students to computers available for student use is 3.5 to 1. When we include the computers in staff rooms and general offices, the student to computer ratio becomes 2 to 1, which is better than the average of 3 students per computer reported in the Preliminary study for special schools From Table 9.3, it can be seen that 47 schools (72.3%) reported having a student to computer ratio of less than 4, 15 schools (23.1%) have a ratio of 4 to less than 8 students per computer and 3 schools

(4.6%) have a ratio of 8 to less than 12 students per computer.

From Table 9.1a (appended at the end of this section) it can be seen that 30% of the MMH schools reported having a ratio of 8 to less than 12 students per computer, and that this was the only school type to have more than 8 students per computer. 66.7% of PS schools and 57.1% of SD schools reported having from 4 to less than 8 students per computer, but otherwise the majorities of schools in each category reported having less than 4 students per computer.

Table 9.4: Locations of computing/network facilities installed in location (School IT Survey, Q. 2b)

Locations	**N**	**Computers**		**LCD Projectors**		**Network ports**		**Wireless, hub or switch connection**	
		Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
General classrooms	66	8.0 (7.1)	8.9	3.4	5.3	13.1	13.1	0.03	0.2
Computer rooms	63	15.9 (17.6)	9.0	1.1	0.7	18.0	10.9	0.05	0.4
MMLC	23	18.1 (3.6)	8.7	1.0	0.2	22.0	11.5	0.0	NA
ITLC	6	22.5 (2.6)	6.1	1.2	0.4	27.0	9.5	0.0	NA
Library	54	3.3 (3.9)	2.5	0.2	0.5	4.4	3.2	0.02	0.1
Special rooms for educational purposes	57	5.2 (3.3)	5.6	1.3	1.7	7.6	8.1	0.02	0.1
Staff rooms	65	9.1 (7.3)	10.2	0.1	0.6	11.0	7.7	0.02	0.1
General office	64	4.5	2.2	0.03	0.3	4.2	2.8	0.02	0.1

Note: The mean in these tables represent the average numbers calculated for the schools that reported to have the facilities housed in the particular location.
Figures in brackets represent Preliminary Study figures.
N = Number of schools reporting to have computing/network facilities installed in that location

As can be seen from Table 9.4, which reports the School IT Survey Item 2b, on average 8 computers per special school were allocated to general classrooms. This is higher than the overall average of 4.7 reported in the Preliminary Study, as are the comparable figures for most other locations.

From the Teachers' and Therapists'/Specialists' Questionnaires parallel items 3a, it can be seen that the comments regarding the IT resources available to teachers, therapists/specialists and students are quite varied. The majority of the teachers (78.5%) agreed or strongly agreed that the IT resources available to teachers in their schools have been improved substantially. 72.1% of the teachers and 66.6% of the specialists/therapists agreed or strongly agreed that the IT resources available to students in their schools have been improved substantially. However, only 44.4% of specialists/therapists agreed or strongly agreed that the IT resources available to specialists/therapists in their schools have been improved substantially. This might imply an increasing discrepancy between the IT resources allocated to teaching and special services.

During the Classroom Visits, some of the participants commented that there were insufficient IT facilities in class for student use. For example, some teachers from the hospital schools said that resources for student learning and class activities were limited:

> *The main difficulties for hospital schools are insufficient resources and limited environment in the hospital wards. Classes conducted in wards are usually equipped with only limited facilities such as one notebook that students need to take turns to use. Students therefore, can only use IT for a short time rather than for the entire class session.*

There is no fixed, regular classroom in hospital schools. Hospital wards have less resources/facilities than normal classrooms. The turnover of hospital students is generally high (except for students with mental problems and students who need to stay in the hospital for a longer period), therefore the following problems are encountered. IT resources for classes are limited: only six out of a total of 17 hospital schools have broadband Internet facilities. This would, therefore, limit the possibility of Internet teaching. Communication between hospital schools and hospital administrators could be improved in order to plan/allocate optimal IT resources for supporting ITEd teaching and learning activities (e.g., broadband and Internet connection).

In the school visits (School Tours), it was found that 5 out of 10 schools visited allow students to use computers in the computer room/library/covered playground at recess or lunch-time. 5 out of 10 schools visited also have a special arrangement for students to use school PCs after school. Some schools let students stay in school freely but require the students to sign to record their attendance. Some schools do not limit the computer usage during these periods, while some schools provide a timetable or guidelines for the students' use.

Table 9.5: Percentage of schools with school website and email accounts for teachers, students and parents (School IT Survey, Q. 4a)

Services	Number of schools with the services	%
School website	63	95.5
Subject/teaching websites or homepages	30	45.5
Intranet for staff	58	87.9
Teachers' homepages (one or more)	26	39.4
Intranet for students	33	50.0
Students' homepages (one or more)	10	15.2
Email accounts on school email server dedicated to:		
Teaching staff	27	40.9
Students	9	13.6
Parents	3	4.6
Free email accounts from other sources allocated by school to:		
Teaching staff	59	89.4
Students	20	30.3
Parents	10	15.2

N = 66

Table 9.5 above shows the percentages of schools with various services available, reported in the School IT Survey item 4a. Nearly all of the special schools (95.5%) in the sample have a school Website. Relatively few special schools (40.9%) have email accounts dedicated to teaching staff and even fewer (13.6%) have email accounts dedicated to students and very few (4.6%) have email accounts for parents. 87.9% of schools have an intranet for staff but less than half have subject or teaching websites (45.5%), teachers' homepages (39.4%), or students' homepages (15.2%). Just 50% of schools have an intranet for students.

Connectivity

All special schools surveyed reported having connection to the Internet. Of these, 93.9% reported that they have broadband Internet connection but only 27.4% have a connection speed at 10 Mbps or above (School IT Survey item 2c). From School IT Survey item 2b(i) it can be seen that while most of the schools have network ports in general classrooms, 6.1% of the respondents to this item indicated that they do not have them in any general classrooms.

82.3% of the responding schools have school intranet (School Heads' Questionnaire item 7) and almost all agreed or strongly agreed that the purposes for developing the Intranet were to improve teaching effectiveness (96.1%), establish/encourage the culture of sharing (98%) and improve school administration/management (98%) (School Heads' Questionnaire item 7a). On School Heads' Questionnaire item 7b the percentages of school heads indicating that they use the school intranet for a range of purposes were high: the highest being for storing teaching, training and learning materials (100%) followed by performing/assisting in school administration/management (96.3%), assisting teaching/training (92.6%) and releasing school news to teachers and students (92.5%). The lowest percentage indicated functioning as a communication platform for school and parents (35.9%) and all other items were checked by around half the respondents. The school heads also gave high ratings for the usefulness/effectiveness of the school intranet for the most purposes, with more than 80% giving ratings of effective/very effective for the first four aforementioned items and from 66.7% to 73.1% for the except functioning as a communication platform for school and parents (50%).

As reported above, 95.5% of the special schools surveyed have a school website and 80.5% of the students from those schools with websites said they knew about this (Students' Questionnaire item 14a), suggesting that there is a high level of awareness among the special students about this kind of facility.

Budgeted Expenditure

Huge progress in IT infrastructure in schools over the five-year period is not surprising since the EMB Document analysis gives a very clear picture of the extensive amount of input and support given by the EMB in terms of financial, advisory and training support. Table 9.6 shows the schools' budgeted expenditure on IT in Education for the academic year 2003/2004.

Table 9.6: Budgeted expenditure on IT in Education in school for academic year 03/04 (School Heads' Questionnaire, Q. 12)

Items	**Total reported amount (HK $)**	**% of total IT expenditure**	**Number of schools reporting non-zero expenses**
Hardware	4 030 755	46.7	57
Consumable items and other general expenses	2 648 254	30.7	61
Technical support services (<u>ex</u>cluding resources/grants/allowances provided by government)	527 387	6.1	47
Software	995 448	11.5	59
Professional training/development for staff	200 530	2.3	55
Others	227 415	2.6	15
Total	8 629 789	100	-

As can be seen from Table 9.6 (School Heads' Questionnaire item 12), the total expenditure on IT by the responding special schools for the academic year 2003/04 was approximately HK$8.6 million and the highest proportion of expenditure was on hardware and consumables. Professional development and training and other items for special school staff has generally received a very small sum in comparison to the amount spent on hardware. However, as has already been mentioned in Chapters 6 and 7, this is not to imply that professional development was not given due attention, as resources for this purpose could be drawn from other sources.

<u>9.1.2 Access and connectivity at home</u>

Home ownership of computers seems to be very common for special school staff, as indicated by School Heads', Teachers' and Therapists'/Specialists' Questionnaire items 1a. More than 97% of each of school heads (98.4%), teachers (98.7%) and therapists/specialists (97.8%) said that they had at least one computer at home. The student data (Students' Questionnaire item 1) indicate that 77.5% of the students have at least one computer at home. Of those who reported having computers at home, 96.7% of school heads (School Heads' Questionnaire item 1b), 94.9% of teachers (Teachers' Questionnaire item 1b), 93.4% of therapists/specialists (Therapists'/Specialists' Questionnaire item 1b) and 80.4% of all students who responded to (Students' Questionnaire item 1a) reported that they have Internet connections at home.

From the quantitative data it was found, however, that some students have difficulties with accessing computers at home. One of the reasons is that the home computer is often reserved for use by non-handicapped siblings. However, the main reason was that many special school students rely on special assistive devices to enable them to make use of computers, and these are either not available to them at home or their parents or other supporters at home do not know how to use them. Furthermore, for many special school students there is a need for tailor-made software, and this is often not available for them to use at home.

9.1.3 Usage

According to the School IT Survey (item 4c), school administration and teaching and learning were ranked as the most common uses of IT in special schools, with means of 4.7 and 4.4 respectively on a 6-point scale measuring extent of use, where 1 represents 'practically no use of IT' and 6 represents 'almost completely IT based'. School library use and communication with staff had respective means of 3.2 and 3.4 but communication with students and parents all had means of less than 3.

School Heads

During the month prior to completing the questionnaire, the majority of school heads (96.9%) had made at least some daily use of computers (School Heads' Questionnaire item 1e). 15.4% said they had used computers not at all or for less than one hour, 32.3% for one to less than two hours, 24.7% for two to less than four hours and 27.8% for four hours or more per day. The most common usage of IT by special school heads (School Heads' Questionnaire item 2) was for school administration (98.4% using computers occasionally or always for this purpose), followed by researching or analysing school data (85.7%). 78.2% said they had used the Internet for inter-school communications and joint school activities, 78.7% said they had applied IT in teaching/training and 62.9% said they had used IT to discuss teaching-related matters with teachers, but less than a half had used it for communicating with students or communicating with parents through E-mail.

Regarding computer use at home, 34.4% of the school heads said they had used computers not at all or for less than one hour, 26.2% for one to less than two hours, 21.3% for two to less than four hours and 18% for four hours or more per day. 1.6% said they had not used computers at home at all during this period (School Heads' Questionnaire item 1c). More than 76% had used their home computer for job-related tasks (76.7%) or for communication (78.3%) or browsing/searching for information (78.3%) (School Heads' Questionnaire item 1d). A relatively lower proportion had used the home computer for other purposes like personal matters such as banking (41.7%), reading news (28.3%) or entertainment (15%).

Teachers

The School Tours indicated that most of the schools have a computer for each teacher at school. In a small number of the schools observed, teachers are able to borrow notebook computers to take home. The School Survey (item 2b) revealed that 13.9% of the special schools surveyed reported having two or fewer computers in staffrooms, 24.7% had four or less and 44.7% had six or less. 26.2% reported having 11 or more computers located in staffrooms.

In the Teachers' Questionnaire item 1e, almost all of the teachers (99.7%) reported having made some use of computers at school. The most common time range reported was between one to less than two hours (22.9% of respondents). 10.6% reported that, in school, they had used computers for less than one hour per day, 17.7% had used them between two to less than three hours and 17.4% had used them for between three to less than four hours. The teachers reported that they spend most of the time using computers at school for teaching (90.8%), information browsing/searching (73.1%) and school administration and management (63.6%) (Teachers' Questionnaire item 1f). Few teachers in special schools reported using school computers for communication (42.8%) or research on teaching (21.4%).

At home (Teachers' Questionnaire item 1c), 97.3% of the teachers reported having spent at least some time per day using computers during the past month. The most common range reported was between one to less than two hours (22.1%). 18.3% reported that they had used computers at home for less than one hour per day, 16.1% had used them for two to less than three hours and 12% had used them for three to less than four hours. The teachers usually spent most of the time on using computers at home (Teachers' Questionnaire item 1d) for communication (71.7%), information browsing/searching (75.7%) and job-related tasks (87.5%). Other uses, such as reading news (36.3%), entertainment (33.6%) and personal matters (31.6%) were reported by less than 37% of the teachers.

Therapists/Specialists

In the Therapists'/Specialists' Questionnaire item 1e, all the therapists/specialists reported having made some use of computers at school. The most common time range reported was from one to less than two hours (31%). 20.2% reported that, in school, they had used computers for less than one hour per day, 20.5% reported two to less than three hours use, with 8.4% having used them for three to less than four hours per day. The specialists/therapists (Therapists'/Specialists' Questionnaire item 1f) reported that they spend most of the time using computers at school for school administration/management (77.5%), information browsing/searching (62.7%), and therapy/training (57.7%). Other uses such as research on therapy/training and communication were reported by 41% or less of the specialists/therapists.

68.3% of therapists/specialists reported using computers at home for up to two hours per day (Therapists'/Specialists' Questionnaire item 1c). 11% reported that they had used computers at home for two to less than three hours and 15.4% had used them for three to less than four hours. The specialists/therapists reported that they usually spend most of the time using computers at home (Therapists'/Specialists' Questionnaire item 1d) for communication (84.8%), information browsing/searching (73.5%) and job-related tasks (80.3%). The pattern is similar to that of school heads and teachers.

Students

89.4% of the students said they had used computers at school during the previous month (Students' Questionnaire item 2). 59% said they had used computers for less than one hour, 18.4% for one to less than two hours, 7.4% for two to less than four hours and 4.6% for more than four hours per day. When asked how often they used computers at school for learning-related activities (Students' Questionnaire item 3) 79.4% said they had made at least some use. 58.1% said they had used computers for less than one hour, 11% for one to less than two hours, 7.7% for two to less than four hours and 2.6% for more than four hours per day.

From Students' Questionnaire item 1b, it was found that 87.2% of the students who have computers at home had made at least some daily use of computers. 42.0% said they had used computers for less than one hour, 23.9% for one to less than two hours, 12% for two to less than four hours and 9.3% for more than four hours per day. 65.7% of students reported having made some use of computers at home each day for school-learning related activities (Students' Questionnaire item 1c). 40.8% said they had used computers for learning related activities at home for less than one hour, 13% for one to less than two hours, 8% for two to less than four hours and 4% for more than four hours per day.

From Student Questionnaire item 4 in Table 9.7, it can be seen that the most common purpose for students to use computers in school is searching for information on the Internet (48.7%). This was reported a lot more than the second most commonly reported purpose, learning computer skills (29.9%). Only a small proportion of the students reported using computers at school for drilling exercises (28%), creative work (25%), self-learning software (15.8%) and project work (14.1%). Presentation/PowerPoint (9.8%) is the least commonly-reported purpose.

Table 9.7: Nature of students' use of computers in school (Students' Questionnaire, Q. 4)

Use	Students (N = 355)
	%
Searching for information on the Internet	48.7
Project work	14.1
Drilling exercises	28.0
Creative work	25.0
Presentations/PowerPoint	9.8
Learning computer skills	29.9
Self-learning software	15.8

Note: Multiple response items

Students indicated that the most common location for using computers outside of school hours is their own home (53%), with 31.6% using them in their own schools, 17.6% at other people's homes and 23.1% in public libraries. Use at other locations, including other schools (3.4%), community/youth centres (11.1%) and cyber-cafes (6.7%) is relatively low (Students' Questionnaire item 16). Since many special school students are school/home-bound due to their mobility problems or limited level of independence, they have rather limited opportunity to use computers outside school/home. Very few students mentioned in the focus group interviews that they have used community/youth centres for IT access.

There are some quite significant differences in students' usage of computers in school across the 11 school types (Table 9.1b, appended at the end of this section), although these figures should be interpreted with caution due to the small sample size. The HI and H schools have the highest percentages of students searching for information on the Internet (81.5% and 83.1% respectively. Fairly high percentages also use IT for this purpose in the SOS (71.8%), VI (60%) and MMH (59.4%) and even the MmodMH schools (45.7%). The lowest use for this purpose is in the SMH schools (7.1%). The use of IT for project work is not particularly high in any of the special schools, although 51.4% in the H schools is considerably higher than any of the others. The use of drilling exercises is the highest in the H schools (43.9%), with the lowest being in the SD (1.9%). Use of IT for creative work was reported by 58.3% of the H schools and 29.9% to 37% of students in the HI, PH, MMH, ModMH and MmodMH schools, with the rest being considerably lower and the lowest in the SMH schools (5%) and followed by SOS schools (5.1%). 44.6% of the HI students and 40.8% of the H students said they made use of IT for presentations but the proportions in others schools were all less than 10%. It was only in the VI, SOS and H schools that 40% or more of the students reported learning computer skills (40%, 45.5% and 65.1% respectively). Use of self-learning software was not reported by more than 28% in any except H schools (52.6%).

The students were asked to elaborate further on the average time per day spent, outside school hours, on a range of activities (Table 9.8, Student Questionnaire item 17).

Table 9.8: Average amount of time spent by students per day outside school hours on various activities (Students' Questionnaire, Q. 17)

Activities	**N**	**Students**						
		% of students choosing						
		None at all	**< 30 min**	**30 min to < 1hr**	**1 to < 2 hrs**	**2 to < 3 hrs**	**3 to < 4 hrs**	**≥ 4hrs**
a	218	44.0	26.7	16.7	8.5	3.4	0.6	0.2
b	216	41.0	27.8	18.8	8.3	3.7	0.2	0.2
c	211	38.5	32.0	15.7	6.9	5.6	1.2	0.2
d	220	21.5	23.8	24.5	14.9	7.7	3.7	3.9
e	220	15.3	24.6	22.7	13.1	8.3	6.8	9.2
f	214	50.0	20.9	12.1	8.5	0.3	5.8	2.4
g	217	42.9	23.4	9.9	8.9	2.8	4.2	8.0
h	216	71.5	12.7	3.5	1.2	4.3	1.9	5.0
i	217	53.7	16.9	8.3	6.3	5.5	3.3	6.1

a. Assignments
b. Using instructional software
c. Participating in other school/learning related activities
d. Searching for information on the Internet
e. Entertainment
f. Downloading documents/files for learning
g. Downloading music/movies/freeware
h. Communicating with teachers through E-mail/ICQ
i. Communicating with classmates/friends through E-mail/ICQ

It can be seen from Table 9.8 that between 50% to 61.5% of the students showed they had spent at least some time doing learning-related activities such as completing assignments (56%), using instructional software (59%), downloading documents/files for learning (50%) and other school/learning-related activities (61.5%). 78.5% reported that they had spent at least some time searching for information on the Internet. It is clear that entertainment-related activities are more popular for students, with 84.7% having spent at least some time on these. Again related to entertainment there are quite large percentages of students having participated in downloading music/movies (57.1%) and particularly in the use of ICQ/email to communicate with classmates and friends (46.3%).

Consistent with the above-mentioned findings, it was found in the student focus group interviews that special school students made more use of computers for entertainment-related activities than anything else. They also said they used home computers for Internet browsing, mostly for projects and homework.

It is interesting to compare the percentages of students who reported spending time on different types of activities. In nearly all of the examples of learning-related activities listed in Students' Questionnaire item 17, 83% or more of the students reported that they either had not done these activities at all or had spent less than one hour per day on them: assignments (87.4%), using instructional software (87.6%), participating in other school/learning-related activities (86.2%) and downloading documents/files for learning (83%). However, the corresponding figures are somewhat lower for entertainment-related activities. For the item 'entertainment' only 62.6% of the respondents said they had not used computers for this purpose or had done so for less than one hour per day, with 76.2% and 78.9% making a similar claim for downloading music/movies/freeware and communicating with classmates/friends through email/ICQ respectively.

Students' Questionnaire items 18 and 19 indicate that 51.6% of students have at least one email account, although personal webpages do not seem to be a high priority for special school students. The majority of students do not have any personal websites (76.7%) and a further 11.1% have only one.

It can be noted that the usage patterns indicated by these data are similar to those shown by the students who completed the IT Activity Daily Log, reported in Research Question Set 5. Parent data can also be used to triangulate with the students' home use of computers. The responses to the

Individual Interviews for Parents corroborate the students' claims that the most common activity is entertainment, followed by searching for information on the Internet and doing activities related to school learning.

The following extracts from interviews with parents give some further indications of the ways in which computers are used by their children with special needs, and give a sense of how important IT is for these children:

> *My child has visual problems. She needs the assistance of software with sound presentation for her to listen and understand the learning materials.*
>
> *The computer can help to train the motor skills of my son in terms of arm, limb and muscle movement.*
>
> *My girl has weak concentration ability, the colour and sound from the computer help to focus her concentrate more easily.*
>
> *My son cannot hold the pen and his control of his hands is getting worse, he now mainly depends on the computer to input data or Word to perform his homework.*

These comments have clear implications that IT pedagogy for special schools is not only concerned with general teaching and learning but also needs to cater for individuals' special needs which may vary according to disability types.

9.1.4 Findings from the qualitative data

Both teachers and heads of special schools generally feel that IT resources are insufficient, especially for Severely Mentally Handicapped (SMH) students. More diversified ranges of customized designed software to match learning and development needs of students with different disabilities should be developed. Teachers requested special devices and time-tabling for special students, e.g., touch-screen, or flexibility in lesson periods and times. The provision of special devices should be accompanied with demonstration or training. Besides the IT hardware and connectivity, IT technical support is crucial in maintaining both generic and special/assistive IT facilities and fabrication of special gadgets. School heads also expressed that, under the ITEd project, special schools were treated as similar to ordinary schools and given funding and resources accordingly even though some of them have unique needs for highly specialized equipment. Therefore, funding support is sometimes insufficient to meet these needs of special schools.

Most of the therapists/specialists also expressed the wish for re-allocation and re-arrangement of IT resources in the special school sector. They believed that the Government has invested a lot of IT resources into the educational sectors in the recent decade, but the allocation has mainly been distributed into normal schools and there is a deficiency in the special school sectors, especially with regard to catering for the special needs of the students, teachers and therapists. There is a demand for additional devices for different disabilities in order to give them an all-round and well-equipped learning environment. One therapist also suggested the need of more research and further development.

It is possible for students with individual difficulties to use IT. For example, some VI students reflected that they had computing facilities with sound/auditory support as a supplement to the IT learning. However, for some SMH students, although there is a provision of special tools to meet with their needs, they cannot use these well because of their lower learning ability. Some PH students may need more special technical support so as to learn and to study, such as in the case of one student with limb movement difficulty whose learning is assisted by using keyboard or special input devices. Some schools may have touch-screen computing facilities for students to learn efficiently but these may not be commonly available at home in order to extend their learning opportunities. The interviews revealed that some PH school students need special inputs or tools for IT services in teaching and learning in real situations. At schools, students usually use computers for Internet searching. For the SMH students, who could not express themselves clearly in the interviews, it was found that they use less IT at home due to the limitations in their cognitive abilities. In Hospital Schools (H), students feel more excited to use IT as they think that it is useful for them. With spatial limitations for the access of IT facilities in hospital schools, it seems that students treasure much more the use of IT. To expand the influence and effectiveness of using IT for learning, some special schools will lend their own programs to students and parents for home usage. It is reported that such a loan system is feasible in some SMH, MmodMH and PH schools. Besides, students and parents can upload and download some software for use from the school websites. Students in the interviews seldom expressed that they needed to use computers to do assignments at home but that they might have some use in schools.

Access at home

Most of the student interviews supported the quantitative data that the majority of students reported that they had computers and internet connections at home. However, generally, it was revealed in the interviews that the students with special needs do not necessarily and automatically have a great deal of opportunity to access computer facilities at home because they are usually dominated by other family members.

Students with different disabilities expressed different and potentially unique concerns about using computers at home. For example, students with visual impairment expressed that they are constrained from using computers at home due to lack of suitable computer accessibility interface and assistive devices. Moreover, gadgets could not be borrowed from school in the same way as was mentioned above for some of the other schools. Similar reports were also obtained from students with physical handicaps. This implies that special school students might face “double-barriers” to using computers at home such as limited opportunity; and lacking of assistive devices even if these are available at school. These situations can restrict the interface between home and school learning.

Table 9.1a: Distribution of schools with respect to student-computer ratios

Student-computer ratio	Overall		PH		MMH		ModMH		MmodMH		SMH		SD		HI		VI		H		PS		SOS	
	No. of Sch	%	No. of Sch	%	No. of Sch	%	No. of Sch	%	No. of Sch	%	No. of Sch	%	No. of Sch	%	No. of Sch	%	No. of Sch	%	No. of Sch	%	No. of Sch	%	No. of Sch	%
8 – <12	3	4.6	0	0.0	3	30.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	-	-	0	0.0	0	0.0
4 – <8	15	23.1	0	0.0	3	30.0	2	15.4	1	20.0	2	25.0	4	57.1	0	0.0	0	0.0	-	-	2	66.7	1	14.3
< 4	47	72.3	6	100.0	4	40.0	11	84.6	4	80.0	6	75.0	3	42.9	4	100.0	2	100.0	-	-	1	33.3	6	85.7
Total	65	100.0	6	100.0	10	100.0	13	100.0	5	100.0	8	100.0	7	100.0	4	100.0	2	100.0	-	-	3	100.0	7	100.0

No. of Sch = Number of Schools

Table 9.1b: Nature of students' use of computers in school (Students' Questionnaire, Q. 4)

Use	Overall (N=355)	PH (N=28)	MMH (N=43)	ModMH (N=38)	MmodMH (N=38)	SMH (N=40)	SD (N=45)	HI (N=30)	VI (N=15)	H (N=18)	PS (N=30)	SOS (N=30)
	%	%	%	%	%	%	%	%	%	%	%	%
Searching for information on the Internet	48.7	35.2	59.4	24.6	45.7	7.1	50.3	81.5	60.0	83.1	44.5	71.8
Project work	14.1	20.8	9.1	2.5	11.1	14.5	15.4	33.3	20.0	51.4	22.2	4.7
Drilling exercises	28.0	24.8	38.5	33.9	39.7	27.0	1.9	9.6	33.3	43.9	13.4	11.8
Creative work	25.0	30.5	29.9	37.0	35.5	5.0	8.5	30.4	6.7	58.3	8.9	5.1
Presentations/PowerPoint	9.8	0.0	9.8	2.5	8.2	0.0	6.8	44.6	6.7	40.8	8.9	6.7
Learning computer skills	29.9	20.1	32.3	31.8	29.3	7.4	12.1	29.6	40.0	65.1	24.5	45.5
Self-learning software	15.8	3.2	11.8	27.7	24.7	9.7	1.9	25.2	13.3	52.6	6.7	3.2

Note: Multiple response items

9.2 Teacher enablement

This section describes special school heads, teachers' and therapists/specialists' perceptions of issues relating to teacher enablement. First, it looks at teachers' and therapists/specialists' competence with respect to use of IT. Related to this is an examination of the most-used providers of professional development activities and the relative effectiveness of these. Since teacher enablement is linked closely with motivation, the factors that motivate teachers and therapists/specialists both to learn IT skills and to use them in their teaching or professional practice have been considered, along with the impact of IT on their teaching or practice. Finally, this section looks at the obstacles and difficulties to implementing IT effectively in education and the teachers' and therapists'/specialists' future development needs.

9.2.1 IT competence level of teachers

From Table 9.9 (Teachers' Questionnaire item 21) it can be seen that 91.5% of the special school teachers surveyed reported that they had reached at least BIT level or equivalent. 84.3% reported having reached the maximum level of IIT and 41.2% and 7.3% at UIT and AIT levels respectively. When the valid percentage is considered (after excluding those teachers who did not respond to this question), the percentages of teachers reported having reached the levels of BIT, IIT, UIT and AIT were 100%, 92.2%, 44.9% and 8.1% respectively. In the Preliminary Study it was reported that 84.9% of special school teachers had submitted their portfolios for BIT, 20.9% for IIT and 2.7% for UIT. There has been a significant increase in these figures since the Preliminary Study.

When teachers were asked to rate themselves with respect to their stage of adopting/using IT (Table 9.10, Teachers' Questionnaire item 1g) 84.3% rated themselves as comfortable/confident, competent or creative – interestingly a very similar pattern as for the school heads' self-ratings (School Heads' Questionnaire item 4) in which 86% rated themselves in the same categories.

Table 9.9: Highest level of IT competence attained by teachers (Teachers' Questionnaire, Q. 21)

Highest Level attained	% (N = 641)	Valid % (N = 585)	Cum. valid %
AIT	7.3	8.1	8.1
UIT	33.9	36.8	44.9
IIT	43.1	47.3	92.2
BIT	7.2	7.8	100.0
Missing	8.5	--	--
Total	100.0	100.0	--

Table 9.10: School heads', Teachers' and Therapists'/Specialists' self ratings on stage of adopting or using IT (School Heads' Questionnaire, Q. 4; Teachers' Questionnaire, Q. 1g; Therapists'/Specialists' Questionnaire, Q. 1g)

Stage	Description	School Heads (N = 64)		Teachers (N = 617)		Therapists/specialists (N = 57)	
		%	Cum. %	%	Cum. %	%	Cum. %
6	Creative (can use it effectively for teaching/administration and integrate into work in creative way)	18.8	18.8	15.5	15.5	1.0	1.0
5	Competent (able to apply appropriately to conduct/assist teaching)	43.8	62.6	51.1	66.6	51.1	52.1
4	Comfortable/confident (comfortable and confident in using it for certain tasks)	23.4	86.0	17.7	84.3	29.3	81.4
3	Beginner (beginning to understand procedures and able to use for certain tasks)	14.1	100	14.3	98.6	14.7	96.1
2	Novice (learning the basic skills but basically not confident and often encounter difficulties)	0.0	100	1.2	99.8	3.9	100
1	Non-user (aware of availability but rarely/never use it)	0.0	100	0.2	100	0.0	100
	Total	100	-	100	-	100	-

When we look at the areas of IT use in which the majority of special school teachers and therapists/specialists have reported themselves to have achieved basic proficiency or above for use in their teaching or therapy/training (Teachers' and Therapists'/Specialists' Questionnaire items 13), we find that the highest are word processing (96.7% of teachers and 96% of therapists/specialists rating themselves as basically or highly proficient), communication (76.6% for teachers and 83% for therapists/specialists), Internet (88.6% for teachers and 88.2% for therapists/specialists) and presentation (79.5% for teachers and 75.4% for therapists/specialists). These were also amongst the skills given the highest ratings in the Preliminary Study. The competence levels for teachers reported in using tools, are all relatively low, with 51.6% reporting that they have basic proficiency or above in using databases and 60.8% in using graphic editing/drawing software, while others, including web design, audio/video editing, simulations, practice and drill, and programming software, were all reportedly used by less than 50% of the teachers. It is also interesting to note that only 68.7% of teachers reported that they were proficient in applying/integrating IT into their subject curricula.

The items receiving low ratings are different for the therapists/specialists. The competence levels for therapists/specialists reported in using tools, such as simulations, databases, graphic and design tools, and even in applying/integrating IT into their subject curricula are all relatively low, with less than 50% reporting at least basic competence to use these in their therapy/training.

9.2.2 Participation in IT-related development activities and usefulness of this participation

It is encouraging that 98.5% of special schools reported that they had an IT Plan/Policy on teacher training/development (School IT Survey item 1h). Development activities provided by schools were the most common, with more than 84% of special school heads (84.1%), teachers (91%) and therapists/specialists (84%) having participated in school-based development activities since the inception of the *Five-Year Strategy* (Tables 9.11, 9.12 and 9.13: School Heads' Questionnaire item 3, and Teachers' and Therapists'/Specialists' Questionnaire items 4), which was higher than any one of the proportions indicated in the Preliminary Study. School-based training was given a mean rating of 3.1 (on a scale from 0 to 4 where 4 represented very effective) by school heads, 2.8 by teachers and 2.6 by therapists/specialists. 88.7% of the school heads, 66.2% of teachers but only 38.2% of therapists/specialists reported that they had participated in professional development activities provided by the EMB. The school heads gave this provision a mean rating of 2.8 and the teachers rated it as 2.5. The therapists/specialists gave this provision a particularly low mean rating (1.7), which suggests that it is not very much tailor-made for the needs of this particular group of practitioners. Participation in professional training/development activities provided by HKedCity was reported as low (22% for heads, 24.2% for teachers and 2.9% for therapists/specialists) although those who did use it gave mean ratings that suggested they thought it was reasonably effective (2.9, 2.7 and 3.0 respectively). Furthermore, this participation could depend upon the actual number of activities organised by HKedCity that these data do not report.

Table 9.11: School heads' participation in professional training/development activities and rating on effectiveness (School Heads' Questionnaire, Q. 3)

Institute	**School Heads**				
	%	**N**	**Rating on effectiveness (0-4)**		
			Mean	**SD**	**N**
Your school	84.1	63	3.1	0.6	53
EMB (Formerly ED)	88.7	62	2.8	0.5	54
HKedCity	22.0	50	2.9	0.6	10
Tertiary institutions	52.7	55	3.0	0.4	29
Non-profit making organizations	40.7	54	2.9	0.5	21
Commercial organizations	56.6	53	2.9	0.6	29

Table 9.12: Teachers' participation in professional training/development activities and rating on effectiveness (Teachers' Questionnaire, Q. 4)

Institute	**Teachers**				
	%	**N**	**Rating on effectiveness (0-4)**		
			Mean	**SE**	**N**
Your school	91.0	621	2.8	0.03	556
EMB (Formerly ED)	66.2	604	2.5	0.03	400
HKedCity	24.2	576	2.7	0.06	137
Tertiary institutions	56.9	590	2.7	0.05	334
Non-profit making organizations	27.7	574	2.7	0.08	143
Commercial organizations	57.1	581	2.6	0.04	319

Table 9.13: Therapists'/Specialists' participation in professional training/development activities and rating on effectiveness (Therapists'/Specialists' Questionnaire, Q. 4)

Institute	Therapists/Specialists				
	%	N	Rating on effectiveness (0-4)		
			Mean	SE	N
Your school	84.0	56	2.6	0.09	48
EMB (Formerly ED)	38.2	56	1.7	0.09	21
HKedCity	2.9	56	3.0	0.00	2
Tertiary institutions	22.2	56	2.5	0.19	13
Non-profit making organizations	4.7	56	2.0	0.00	3
Commercial organizations	18.8	52	2.1	0.06	10

The teachers were asked to indicate the extent of their roles in activities for promoting IT in teaching (Teachers' Questionnaire item 18). 52.8% said they have occasionally or always participated in planning or promoting the use of IT in teaching or the integration of IT into the curriculum. However, only 36% said they have made suggestions about the purchase of software. Similarly only about one-third of the therapists/specialists said they have made suggestions about the purchase of software (Therapists'/Specialists' Questionnaire item 18), and 38.2% said they have occasionally or always participated in planning or promoting the use of IT in therapy/training or the integration of IT into the curriculum. It does not seem to be conducive to encouraging teachers to use the software effectively in their classes if they have not been instrumental in making the choice of what to use. Only 23.1% of the teachers and 9.5% of the therapists said they had participated in research on school-based initiatives. Other roles were reported as occurring infrequently: 69.8% said they rarely/never organised/arranged staff to participate in IT training, 73.3% rarely/never provided/arranged technical support in school, 77.7% rarely/never handled tasks related to the maintenance of IT facilities/resources, and 80.8% rarely/never organised exchange programmes to share experiences with other schools relating to IT in education. When we look at teachers' reported roles in helping colleagues to solve problems encountered in using IT in their teaching (Teachers' Questionnaire item 17) we can see evidence of quite active participation, with 74.3% saying they had done this occasionally or always and only 1.9% saying they had never done this.

9.2.3 Motivation for acquiring IT skills

The main motivations that the special teachers identified for learning IT skills (Teachers' Questionnaire item 15) were to improve their teaching (indicated by 85.8%) followed by the desire to acquire a basic life skill (74.6%) and to apply IT in teaching (71.2%). Only a few indicated they had been motivated by factors such as promotion prospects (10.1%) or compliments from others (19.2%) despite the fact that they were able to identify as many options as they wanted. It is also interesting to note that 50.8% and 51.6% were motivated to learn and apply IT (Teachers' Questionnaire item 16) respectively because of their school head's request or expectation, thus suggesting that the school leader's expectation is an important contributing factor to teachers' participation but not the only one.

The main motivations that the therapists/specialists identified for learning IT skills (Therapists'/ Specialists' Questionnaire item 15) were to apply IT in therapy/training (indicated by 69.3%) and their own quest for knowledge (68%), followed by improving their therapy/training (68.1%) and then the desire to acquire a basic life skill (67.6%). Only a few indicated they had been motivated by factors such as promotion prospects (2.2%) or the influence of others. Extrinsic factors, such as suggestions from colleagues or friends, were identified by only 17.1% and the demand from EMB by 15.5% of the respondents despite the fact that they were able to identify as many options as they wanted. It is also interesting to note that 32.5% of the therapists/specialists were motivated to learn IT and 28.7% were motivated to apply it because of their school head's request or expectation.

There is some inconsistency (Tables 9.14 and 9.15) between the high percentage of teachers who reported they were motivated to learn IT skills to improve their teaching (85.8%), and the relatively low percentage (49.5%) saying that student accomplishment (including enhancing quality of learning) was a motivator for them when it came to actually applying it in their teaching (Teachers' Questionnaire item 16). In fact, the main motivator for applying IT in teaching was reported to be their growing maturity in IT literacy (76.5%), followed by the trend for using IT in education (66.1%), thus suggesting that as their competence and confidence mature they are more willing to attempt to put it into practice.

With a similar pattern, there is also some inconsistency (Tables 9.16 and 9.17) between the high percentage of the therapists/specialists who reported they were motivated to learn IT skills to improve their therapy/training (68.1%), and the relatively low percentage (51.7%) saying that student accomplishment was a motivator for them when it came to actually applying it in their therapy/training (Therapists'/Specialists Questionnaire item 16). In fact, the main motivator for applying IT in therapy/training was also reported to be their growing maturity in IT literacy (55.3%), thus suggesting that, the same as teachers, as their competence and confidence mature they are more willing to attempt to put it into practice.

Table 9.14: Factors motivating teachers to learn IT skills (Teachers' Questionnaire, Q. 15)

Factors	%
Quest for knowledge	68.5
Improve teaching	85.8
Compliments from others	19.2
Apply in teaching	71.2
School/head's request/expectation	50.8
Promotion prospect	10.1
Basic life-skill	74.6
EMB's demand	38.5

Note: N = 641. Multiple responses items

Table 9.15: Factors motivating teachers to apply IT in teaching (Teachers' Questionnaire, Q. 16)

Factors	%
Maturing in IT literacy	76.5
Students' request/expectation	35.3
School/head's request/expectation	51.6
Students accomplishment	49.5
Colleagues' encouragement	21.4
ITEd policy from government	41.2
Parent's request/expectation	12.3
Trend in education	66.1

Note: N = 641. Multiple responses items

Table 9.16: Factors motivating specialists/therapists to learn IT skills (Therapists'/Specialists' Questionnaire, Q. 15)

Factors	%
Quest for knowledge	68.0
Improve therapy/training	68.1
Compliments from others	17.1
Apply in therapy and training	69.3
School/head's request/expectation	32.5
Promotion prospect	2.2
Basic life-skill	67.6
EMB's demand	15.5

Note: N = 60. Multiple responses items

Table 9.17: Factors motivating specialists/therapists to apply IT in therapy/training (Therapists'/Specialists' Questionnaire, Q. 16)

Factors	%
Maturing in IT literacy	55.3
Students' request/expectation	21.8
School/head's request/expectation	28.7
Students accomplishment	51.7
Colleagues' encouragement	9.0
ITEd policy from government	14.5
Parent's request/expectation	3.4
Trend in education	49.4

Note: N = 60. Multiple responses items

9.2.4 Impact of ITEd on teachers

On School Heads' Questionnaire item 8b (Table 9.18), the special school heads rated the greatest impacts of IT on teachers' teaching as being increased IT knowledge (98.5% rating agree or strongly agree), encouragement for teachers to apply IT in their teaching (96.9%), making school administration/ management work more convenient for teachers (93.8%) and enhancing co-operation among teachers (90.8%). 73.9% of the school heads agreed or strongly agreed that the use of IT had encouraged teachers to make more use of student-centred learning and 60.1% thought that it strengthened communication between teachers and students.

Teachers' Questionnaire, item 19 (Table 9.19) asked teachers to rate the impacts of ITEd on themselves. The highest percentage rated enhanced teaching effectiveness (83% rating this as agree or strongly agree), followed by increased awareness of what is happening in the outside world (63.7%) and increased awareness of what is happening in the local society/Mainland China (59.2%). In contrast to the school heads' ratings, only 38% agreed or strongly agreed that it strengthened communication between teachers and students.

On the other hand, of the special school therapists/specialists (Table 9.20, Therapists'/Specialists' Questionnaire, item 19) 64.8% agreed or strongly agreed that the impacts of IT on them had been enhanced therapy/training effectiveness and 42.5% agreed or strongly agreed that it had strengthened communication with school. It appears from these data that the therapists/specialists tend to be more ambivalent than the teachers about the impact of ITEd on themselves.

The school heads gave low priority to negative impacts such as teachers' stress levels, self-esteem and confidence, with means of below 2 and less than 24% agreeing or strongly agreeing that these had impact on the teachers' use of IT in teaching.

The teachers themselves also placed less importance on negative consequences like less time and exhaustion caused by information overload than they did on other things, although there were between 30.9% and 44.5% who were bothered by these negative impacts. The therapists/specialists themselves also placed less importance on negative consequences like less time and exhaustion caused by information overload than they did on other things, although there were between 15.8% and 21.7% who were bothered by these negative impacts. Certainly more teachers indicated awareness of these negative impacts than school heads, which suggests there may be a mismatch in the two groups' perceptions of the stress and time constraints that are really imposed on teachers by the introduction of IT.

Table 9.18: School heads' perception of impact of ITEd on teachers, based on their experience of promoting IT in Education (School Heads' Questionnaire, Q. 8b)

Impact	Mean (0-4)	SD	N	% of heads choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
Enhanced co-operation among teachers	3.2	0.6	65	30.8	60.0	7.7	1.5	0.0
Increased IT knowledge	3.6	0.5	65	64.6	33.9	1.5	0.0	0.0
Encouraged teachers to adopt student-centered mode of learning	3.0	0.7	65	26.2	47.7	26.2	0.0	0.0
Strengthened communication among teachers and students	2.7	0.8	65	13.9	46.2	33.9	6.2	0.0
Increased interactions with people outside the school, broadening their professional vision	2.9	0.8	65	23.1	50.8	21.5	4.6	0.0
Teachers are not confident in using IT appropriately	1.3	0.9	65	1.5	9.2	18.5	56.9	13.9
Teachers find using IT stressful	1.8	0.9	65	3.1	20.0	30.8	41.5	4.6
Lowered self-esteem and professional confidence	0.8	0.7	65	1.5	1.5	6.2	61.5	29.2
Strengthened communication among teachers	3.0	0.7	65	20.0	56.9	21.5	1.5	0.0
Encouraged teachers to apply IT in regular teaching	3.2	0.5	65	24.6	72.3	3.1	0.0	0.0
Strengthened communication between teachers and parents	2.2	0.8	65	6.2	26.2	55.4	10.8	1.5
Made school admin/management work more convenient for teachers	3.2	0.6	65	24.6	69.2	4.6	1.5	0.0

Table 9.19: Teachers' perceptions of impact of ITEd on themselves since the introduction of ITEd (Teachers' Questionnaire, Q. 19)

Impact	Mean (0-4)	SE	N	% of teachers choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
Enhanced teaching effectiveness	3.0	0.03	628	18.7	64.3	14.6	1.9	0.4
Exhausted/information overload	2.1	0.03	628	3.1	27.8	45.7	21.8	1.7
Less time for class preparation	2.3	0.03	627	7.1	37.4	36.4	18.1	1.1
Less time for contact with students	2.1	0.02	628	5.3	27.7	37.5	27.3	2.2
Increased awareness about outside world	2.6	0.04	627	8.9	54.8	26.6	8.9	0.9
Increased awareness about local/Mainland society	2.5	0.04	626	7.9	51.3	29.1	10.3	1.4
Enlarged social circle	2.0	0.05	625	4.5	24.5	45.1	22.5	3.5
More collaboration with colleagues	2.4	0.04	625	5.5	44.5	36.1	12.8	1.2
More collaboration with teachers in other schools	2.0	0.07	626	2.9	25.1	47.4	20.1	4.5
More collaboration with other organizations	2.0	0.06	623	2.3	23.3	50.1	19.1	5.2
Strengthened communication with parents	1.9	0.05	625	2.1	21.4	46.5	24.2	5.8
Strengthened communication with students	2.1	0.07	626	2.7	35.3	39.3	18.3	4.5
Strengthened communication with school	2.4	0.05	622	7.6	46.0	32.3	11.0	3.1

Table 9.20: Therapists'/Specialists' perceptions of impact of ITEd on themselves since the introduction of ITEd (Therapists'/Specialists' Questionnaire, Q. 19)

Impact	Mean (0-4)	SE	N	% of therapists/specialists choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
Enhanced therapy/training effectiveness	2.6	0.09	57	3.0	61.8	25.7	9.6	0.0
Exhausted/information overload	1.8	0.08	57	0.0	16.9	42.5	40.6	0.0
Less time for class preparation	2.0	0.10	57	5.2	16.5	51.5	26.8	0.0
Less time for contact with students	1.8	0.12	57	6.0	9.8	44.9	36.3	3.0
Increased awareness about outside world	2.1	0.16	57	6.0	30.6	37.4	22.3	3.6
Increased awareness about local/Mainland society	2.0	0.17	57	6.0	24.6	39.7	26.1	3.6
Enlarged social circle	1.6	0.11	57	2.2	10.3	40.1	37.8	9.5
More collaboration with colleagues	2.1	0.14	57	4.0	33.4	37.4	19.4	5.9
More collaboration with therapists/specialists in other schools	1.7	0.13	57	2.2	13.5	48.6	24.2	11.5
More collaboration with other organizations	1.7	0.11	57	2.2	15.5	43.1	25.8	13.4
Strengthened communication with parents	1.7	0.17	57	1.8	11.7	56.6	17.8	12.1
Strengthened communication with students	1.7	0.12	57	1.9	14.3	48.0	20.6	15.2
Strengthened communication with school	2.1	0.20	57	4.0	38.5	31.2	16.9	9.5

9.2.5 Obstacles and difficulties faced by teachers

The difficulties described by special school heads, teachers, therapists/specialists and IT team members are similar (School Heads Questionnaire item 17, IT Team Members' Questionnaire item 4 and Teachers' and Therapists'/Specialists' Questionnaire items 6).

The difficulties rated by the highest proportion of school heads are lack of suitable educational software or IT teaching resources (87.5%), the workload of teachers being so heavy that they do not have time to adopt IT in teaching (80%), teachers' need for time to prepare to use IT affecting their teaching quality (77.4%) insufficient IT facilities in classrooms (75.4%) and teachers' lack of knowledge or skills to apply IT in education (73.9%). For all of these, the majority of school heads rated these difficulties as average to serious.

Interviews with heads of special schools reveal that students in special schools have unique needs quite different from those in normal schools. The school heads explained that the current ITEd strategy is by and large for general school education, it does not address the specific needs of special schools. While the needs of specific school types are different, the needs of individual students in the schools are also different, as exemplified by the following quotation:

> *EMB treats us as any other schools in Hong Kong, but in fact, not only are special schools different from common schools, each special school is different as we are serving students with different types of problems. Each special school has its own individual needs for hardware and software. Firstly, funding is not sufficient. Secondly, appropriate hardware, devices and software are not available in Hong Kong. It is difficult to source and extremely expensive to buy from overseas.*

The difficulties rated by high proportions of IT team members were insufficient IT resources in school (85.7%), their own daily workload being so heavy that they do not have time to cope with the extra work of the IT team (85.4%), inadequacy of their own IT knowledge or skills (80.3%), other teachers' lack of knowledge to apply IT in teaching (76.5%) and the workload of other teachers being so heavy that they do not have time to adopt IT in teaching (74.8%). These were mostly rated as average to serious by the majority of IT team members with the exception of teachers' lack of IT knowledge skills (average to not very serious).

The highest proportions of teachers rated the main difficulties associated with their use of IT in their classrooms as being workload (81%), time taken to prepare IT materials affecting their teaching quality

(75.3%) and lack of suitable educational software or IT resources (72.2%). The majority of teachers rated these as average to serious.

The highest percentages of therapists/specialists also rated the workload (87.5%), followed by mismatch between the professional development and their needs as a difficulty (85.7%), lack of suitable assistive devices to help students with IT (76.1%), lack of suitable educational software or IT resources (75.3%), time taken to prepare IT materials affecting the quality of their work (76.4%), insufficient computers (70.5%), and lack of knowledge or skills in applying IT in therapy or training (75.8%). These were all rated by the majority as average to serious.

9.2.6 Findings from the qualitative data

In the interviews the school heads expressed that teachers are occupied with heavy workloads and tight teaching schedules, and are thus restricted in time from receiving the training provided by EMB, although training is considered useful. When considering whether teachers should have professional training, the heads themselves also think that they also need training themselves too, but the opportunities for them are rarer and there is inadequate financial or time support. In fact, it is assumed that outsiders, such as the HKedCity, can provide supplementary support to them.

Teachers also expressed concern over management of training. They claimed that the Government should keep regular control over the BIT, IIT and UIT courses provided by other commercial sectors. This can in turn save resources. They also suggested increasing the chance for in-service IT training and collaborative teaching, and that minimizing the workload of the teachers will allow more time for them to prepare IT lessons and understand the needs of the students.

Some therapists emphasised the need for formal and sufficient IT training for supporting the therapy which can be, in turn, beneficial to the students. One therapist of a MmodMH School said that he/she hoped to have more special training for the Speech and Hearing Therapists. A therapist of a SMH School also expressed the need for formal training.

In terms of teacher enablement and professional development, teachers of special schools expressed that since IT was started in special schools much earlier than the ITEd implementation in ordinary schools, special school teachers have for some time been equipped to apply it in teaching. They have been communicating with peer teachers of other schools to improve their IT usages. However, since the students' needs and related pedagogical measures are very different among different schools, mutual support, although needed, is rather limited.

School heads and teachers requested that the Government implement similar staff development policies and support to both ordinary and special schools. However, in addition to teaching, IT has also been applied for developing students' life skills, for example communication and mobility skills. In many cases, special collaborative learning was arranged for teachers to learn how to use customized or newly developed assistive devices in assisting students' development. Therefore, staff development programmes should be initiated by individual schools/school types rather than by EMB. Moreover, they suggested that EMB should provide more support for these customized staff development initiatives rather than general IT training, e.g., those provided by IT professionals who have IT expertise but no knowledge about special education. They generally prefer training initiated by their own school or schools that serve the same student groups.

Therapists expressed strong needs to be equipped with updated IT skills to support their services. They have been applying IT to help students to develop more independent living skills, such as self-care, prevocational skills and social communication. Some therapists have formed special interest groups to share their IT application regularly. They are looking forward to having multi-disciplinary collaboration to apply IT to students' development. However, they found that they have less staff development opportunities than teachers.

9.3 Curriculum, pedagogy and resources

This section begins by looking at the special school teachers' and therapists'/specialists' beliefs about IT in education, particularly their special objectives for using it in their teaching or therapy/training. Their common beliefs are then used as a basis for examining what occurs in actual practice. This examination focuses on the actual hardware and software that are used and the ways in which they are used, in order to examine whether these practices are in fact conducive to promoting effective teaching, therapy/training and learning through the use of IT. Some interesting comparisons are made between the special school heads' perceptions of what is happening in the classroom and the teachers', therapists'/specialists' and students' descriptions of actual practices. The section also examines school heads', teachers' and therapists'/specialists' perceptions of the impact of IT on the curriculum design, teaching, and therapy/training approaches, and finally considers the support needs seen as priorities by different stakeholder groups.

9.3.1 Teachers' beliefs about ITEd

This section will begin with a discussion of teachers' perceptions of and beliefs about the actual and potential impacts of IT on their teaching, as well as an examination of the matches or mismatches between their beliefs and their actual practices. In the same way, therapists'/specialists' perceptions and beliefs about the actual and potential impacts of IT on their actual therapy/training will be discussed. While there are some interesting results reported below regarding teachers' and therapists'/specialists' perceptions of IT in teaching and training/therapy, it is also worth noting that at this stage of the initiative there is no overwhelming support with respect to perceived benefit in using it for assessment.

When we examine the special school teachers' primary objectives for using IT in teaching (Table 9.21, Teachers' Questionnaire item 11), we can see that the majority reported that they place high priority on objectives like enhancing teaching effectiveness (87.3% rating this as 'agree' or 'strongly agree'), assisting students with learning difficulties or special education needs by specifically designed software/hardware (81.1%) and providing students with more opportunities for self-learning (75.2%). Objectives concerned with communication and collaboration are given relatively lower priority: communication among students (40% agreeing/strongly agreeing that this is a primary objective), communication between students and teachers (44.5%), communication between school and parents (44.4%) and opportunities for students to work collaboratively (47.7%).

Table 9.21: Teachers' primary objectives for using IT in teaching (Teachers' Questionnaire, Q. 11)

Objectives	Mean (0-4)	SE	N	% of teachers choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
To realise effects that can only be achieved by using IT	2.6	0.04	607	10.5	50.6	26.6	10.2	2.1
To enhance teaching effectiveness	3.1	0.02	619	22.2	65.1	10.3	1.9	0.5
To strengthen communication among students	2.2	0.05	607	4.8	35.2	42.8	12.9	4.3
To provide more opportunities for student to work collaboratively	2.4	0.05	611	5.9	41.8	37.4	11.7	3.2
To strengthen communication between teachers and students	2.3	0.05	607	5.1	39.4	38.8	12.5	4.2
To strengthen communication between the school and parents	2.3	0.04	606	7.1	37.3	40.5	12.4	2.8
To provide students with more opportunities for self-learning	2.9	0.05	616	20.8	54.4	17.8	4.1	3.0
To provide students with more opportunities for self-assessment	2.4	0.05	601	9.9	40.0	35.1	10.9	4.1
To assist students with learning difficulties or special education needs by specifically designed software/hardware	3.0	0.04	600	25.7	55.4	15.2	2.5	1.2

During one of the post-classroom visit discussions, the teacher further explained the reason for using computers:

> *IT can actually help students to visualise the abstract concepts. Through the use of an animated story, we can teach students daily life skills and different knowledge that they need to adopt in their lives. The multimedia effects attract the attention of the students since they are very easily distracted by other things. It also helps us to present ideas and concepts about the subject content more easily. Some available educational software also allows us to create games and exercises easily for students to participate in during lessons. This arrangement helps them to grasp the knowledge more easily.*

The item examining therapists'/specialists' objectives for using IT in therapy/training (Table 9.22, Therapists'/Specialists' Questionnaire item 11) shows that the majority think their highest priority is to assist students with learning difficulties or special education needs by specifically designed software/hardware. More than 50% of them share similar viewpoints with teachers about enhancing therapy/training and student learning through IT. Similar to special school teachers, only 13% of therapists and specialists agreed that the strengthening of communication among students, for instance, is their specific objective.

It can be seen from Table 9.3a (appended at the end of this section) that the ModMH and SMH teachers expressed some beliefs that differed substantially from the norm. The ModMH teachers gave lower mean ratings than the overall means for the objective of strengthening communication between teachers and students (1.8). The SMH teachers gave lower mean ratings for the importance of strengthening communication among students (1.7). As well they rated providing students with more opportunities for self learning (2.0) and providing students with more opportunities for self assessment (1.9) as lower than the norm.

Table 9.22: Therapists'/Specialists' primary objectives for using IT in therapy/training (Therapists'/Specialists' Questionnaire, Q. 11)

Objectives	**Mean (0-4)**	**SE**	**N**	**% of therapist/specialists choosing the option**				
				Strongly agree	**Agree**	**Neutral/ uncertain**	**Disagree**	**Strongly disagree**
To realise effects that can only be achieved by using IT	2.5	0.18	55	9.7	44.0	33.5	7.9	4.8
To enhance therapy/training effectiveness	2.6	0.17	55	6.4	56.9	29.3	5.6	1.9
To strengthen communication among students	1.7	0.13	55	4.2	8.8	55.6	17.6	13.9
To provide more opportunities for student to work collaboratively	1.9	0.13	55	1.9	18.9	53.4	18.0	7.9
To strengthen communication between therapists/specialists and students	1.8	0.07	55	0.0	19.3	49.9	21.0	9.8
To strengthen communication between the school and parents	2.2	0.11	56	0.0	35.1	51.9	7.1	5.9
To provide students with more opportunities for self-learning	2.3	0.14	55	11.2	40.4	28.2	10.9	9.3
To provide students with more opportunities for self-assessment	2.0	0.11	54	2.8	23.6	50.4	13.9	9.3
To assist students with learning difficulties or special education needs by specifically designed software/hardware	3.0	0.17	53	31.9	43.2	21.2	0.0	3.7

Table 9.3b (appended at the end of this section) shows some differences from the norm in mean ratings given by HI, ModMH, SMH and MMH therapists/specialists. The ModMH therapists/specialists gave a higher rating for providing students with more opportunities for self learning (3.2). The SMH therapists/specialists gave lower ratings for the objectives of providing students with more opportunities for self learning (1.7) and providing students with more opportunities for self-assessment (1.5). The MMH therapists/specialists rated lower for realising effects that can only be achieved by using IT (2.1). The HI therapists/specialists had higher than mean ratings on three objectives: strengthening communication

among students (3.0), strengthening communication between therapists/specialists and students (3.0) and strengthening communication between the school and parents (3.0).

As can be seen from Table 9.23 (Teachers' Questionnaire item 14d), when it comes to actually describing teachers' use of IT in the lessons with which they were the most satisfied, the special school teachers' paradigm still seems to be very much knowledge based, with very high proportions seeing their roles as being to transmit knowledge (93% agreeing or strongly agreeing), provide learning materials and activities to enable students' understanding of subject content (88.2%) and teaching new knowledge (86%). On the other hand only 46.1% of them perceived their roles to be to engage students in problem analysis and information searching and 56.4% for creative tasks. Compared to the results of the parallel item on the Preliminary Study questionnaire, it can be seen that there is very little change in the teachers' priorities and perceptions of their roles. Consequently it seems from these data that the majority of special school teachers surveyed still perceive the use of IT to be as a tool to support teacher-centred learning and that only about half are showing signs that they are changing towards a more student-centred, constructivist, problem-solving paradigm.

The patterns of teachers' use of IT are reinforced by the students' perceptions of the lessons using computers they liked the most (Students' Questionnaire item 13d). When asked to describe the teachers' roles during these lessons the most common were transmitting a lot of correct knowledge (rated as agree/strongly agree by 88.1% of the students), teaching new knowledge (74.9%), and providing drilling exercises was described by 77.7%. The teacher's role in providing appropriate learning materials and activities to enable understanding of the subject content was described by 77.1% and provision of opportunities to learn through creative activities was rated agree/strongly agree by 74%. Engagement in small group activities in problem analysis and information searching was rated highly by 65.3%.

In the post-classroom observation interviews most teachers reported that they understand there is a need to use IT in the teaching and learning activities in class. Since some special school students have more difficulties than normal students with paying attention for a long time, the audio-visual effects provided by IT software enhance students' concentration on the subject matter. The teachers also said they believe IT can assist students to visualise the content of the subject by having animated cartoon figures and stories on the screen. There are some special needs students who have physical problems. They require special input devices to help them enter data or words into the computer so that they can communicate with others, search for information or perform homework exercises. This can then encourage their learning. Therefore, teachers perceive the need for incorporating IT components into the curriculum design to enable the delivery of more effective teaching and learning. The only thing the teachers reported they found difficult is the amount of time required to find appropriate information or resources from Internet to enrich the subject content. Apart from searching for teaching materials from the Internet, they usually develop their own PowerPoint slides for the class since it is easier for them to customize the presentation of materials and this is important to cater for different needs of special students.

Table 9.23: Teachers' perceptions of their main roles in lesson with IT application that they were the most satisfied (Teachers' Questionnaire, Q. 14d)

Roles	Mean (0-4)	SE	N	% of teachers choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
Transmit correct knowledge to students	3.3	0.03	619	37.3	55.7	5.7	1.1	0.2
Allow students to do drilling exercises with the computers	2.4	0.05	605	7.8	42.5	29.9	16.7	3.1
Provide appropriate learning materials and activities to enable students to understand the subject content	3.1	0.03	618	26.2	62.0	10.4	0.6	0.8
Engage students in small group activities in problem analysis and information searching	2.3	0.06	598	8.1	38.0	34.1	12.7	7.2
Provide opportunities for students to learn through creative activities	2.5	0.06	607	10.9	45.5	27.9	10.4	5.3
Teach students new knowledge	3.1	0.03	614	25.5	60.5	12.2	0.6	1.2
Provide diversified exercises/practices	3.0	0.03	613	19.8	61.4	14.9	2.6	1.3

When students were asked to report their perceptions of the lessons using computers they liked the most (Students' Questionnaire item 13c). 78.5% of the students reported that in these lessons their teachers had been explaining and demonstrating to the whole class for at least half of the time. On the other hand, 50.9% of the students said students had worked individually with the computers a small proportion or none of the time and 68.1% said students had worked in small groups with the computers a small proportion or none of the time.

Table 9.24 (Therapists'/Specialists' Questionnaire item 14d) shows that in activities involving IT with which the therapists/specialists have been the most satisfied their main role has been to transmit knowledge to students (71.9% agreeing or strongly agreeing with this). This was followed by providing appropriate training/therapy materials and activities to enable the students to understand the training content (63.9%), providing diversified exercises/practices for the training/therapy (61.1%) and teaching students new knowledge for the training/therapy (51.2%). The least frequent role perceived by the therapists/specialists is engaging students in small group activities for the training/therapy and analyzing the keys of training (24.4%). The results are similar to those shown for the teachers' responses.

Table 9.24: Therapists'/Specialists' perceptions of their main roles in training/therapy session with IT application that they were the most satisfied (Therapists'/Specialists' Questionnaire, Q. 14d)

Roles	Mean (0-4)	SE	N	% of therapists/specialists choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
Transmit correct knowledge to students	2.7	0.19	51	17.4	54.5	16.2	4.0	7.9
Allow students to do drilling exercises with the computers for training/therapy	2.1	0.17	52	4.0	31.8	45.1	9.6	9.6
Provide appropriate training/therapy materials and activities to enable students to understand the training content	2.6	0.17	52	12.4	51.5	24.4	2.0	9.6
Engage students in small group activities for the training/therapy and analyze the keys of training	2.0	0.12	50	7.6	16.8	52.5	14.9	8.2
Teach students new knowledge for the training/therapy	2.4	0.10	52	7.8	43.4	34.7	8.0	6.1
Provide diversified exercises/practices for the training/therapy	2.5	0.16	52	9.5	51.6	24.7	6.6	7.7

9.3.2 Actual practices: Curriculum integration

Since there are over sixty curriculum areas covered across the range of special schools (Students' Questionnaire item 6) it is difficult to make any generalisations about the most common subjects in which IT is used. However, some examples from different school types have been included here to give an indication of the ways in which it is being used. 74.8% of HI, 56% of PH and 47.9% of SD students said that computers had been used in their Chinese language classes. The other more frequently reported subject areas were English language (50% of H students, 61.5% of HI and 43.9% of SD students), Putonghua (57.8% for PS students) and Mathematics (74.5% of H students).

9.3.3 Actual pedagogical use by teachers

Table 9.25: Frequency of computer use by teachers during class in past month as reported by students (Students' Questionnaire, Q. 7)

Frequency	Students (N = 236)	
	%	Cum. %
Almost daily	16.9	16.9
2-3 times a week	46.8	63.7
About once a week	14.0	77.7
2-3 times per month	10.8	88.5
Not at all	11.5	100.0
Total	100	-

The data shown in Table 9.25 (Students' Questionnaire item 7) suggest that the actual amount of computer use by teachers during class was not very high. Only 63.7% of the students reported their teachers having used IT in class more than two or three times per week – out of a total of more than 30 lessons per week.

The School Tours revealed evidence that most of the special schools have multimedia labs and computer rooms for students to use IT facilities. In general classrooms, there is usually only one computer for the whole room. During Classroom Visits it was observed that IT facilities were used to assist teaching and learning activities in some lessons other than Computer Learning. This was particularly in subjects like Mathematics, Chinese and English language. These observations are actually quite a close match with what was reported in the previous section about what the students have said about the usage of computers in the curriculum areas. During some of the Classroom Visits it was observed that the students usually reacted excitedly to the games or the subject content of the lesson, particularly to the audio-visual effects. This actually seemed to facilitate their learning motivation quite a lot. Although the use of presentation software did appear to have a good effect on drawing and maintaining the children's attention, it did not replace the need for the teachers to be constantly using other strategies to focus the children's attention, since students in special schools are easily distracted by other events in the surrounding areas. For example, there was one student who suddenly started to clean the floor with a tissue in the middle of the class, and the teacher had to stop her immediately and to direct her attention back to the topic. Even the IT presentation was not sufficient to focus this student's attention to the extent that she would not become distracted by other things.

The School IT Survey data (item 4d) asked for different applications to be rated on a scale from 1 to 6 according to the extent of their use, where 1 represented 'no use' and 6 represented 'most of the time'. The highest mean rating (5.9) was given to word processing, then presentation software (5.3), Firewall/anti-virus/security software (4.9). Learning-related games (4.3) and spreadsheet software (4.0) were reported as being used to some extent.

Teachers' self-reports of the software they are using (Table 9.26, Teachers' Questionnaire item 12) are consistent with other data suggesting that word processing software is being used a lot (95.3% reporting that they use this occasionally or always), along with presentation (84.3%) and multimedia software (83%). The above findings in fact match what has been observed in the Classroom Visit as most of the teachers have used PowerPoint presentation, other educational presentation software, and self developed education software. This kind of presentation software has allowed teachers to develop exercises and animated presentation games that encourage students to participate in the lesson.

Table 9.26: Frequency of software used in teaching reported by teachers (Teachers' Questionnaire, Q. 12)

Software	% of teachers choosing the option				N
	Always	Occasionally	Rarely	Never	
Word processing software	82.9	12.4	2.6	2.1	624
Spreadsheet software	21.9	41.4	25.5	11.2	615
Database software	23.0	32.3	28.9	15.8	619
Presentation software	53.3	31.0	10.0	5.7	616
Communication software	36.8	33.0	19.5	10.7	607
Web design software	14.5	36.1	36.9	12.5	615
Audio/video editing software	18.6	38.3	31.0	12.1	616
Graphics editing/drawing software	33.5	41.8	18.0	6.7	614
Multi-media software	36.1	46.9	12.8	4.2	619
Simulation software	9.7	28.0	39.3	23.1	611
Practice and drill software	19.7	41.6	26.7	12.0	610
Educational software developed by yourself	29.2	34.0	21.7	15.1	618
Educational software developed by your school	20.1	36.5	26.3	17.0	616
Educational software developed by EMB (Formerly ED)	6.6	42.1	33.2	18.0	612
Educational software or teaching materials obtained from HKedCity (HKedCity.net)	23.5	44.5	18.7	13.3	618
Educational software developed by other government departments/voluntary organizations/tertiary institutions	7.1	42.0	36.1	14.8	614
Educational software provided by textbook publishers	15.9	36.9	29.6	17.7	615
Educational software developed by other software vendors	9.2	41.6	34.9	14.3	608

From Table 9.3c (appended at the end of this section) it can be seen that word processing software is used by more than 93% of schools of all types except SMH, and even in the latter is used by 82.7%. Multimedia software is used by more than 80% of all school types except for H (79.4%), SOS (76.1%) and VI (65.5%). There are some distinct differences in the usage patterns of software by teachers across schools. Spreadsheet software is used by high percentages of teachers in PS (90.6%), SOS (82.7%), HI (80.6%), SD (76.9%) and VI (75%) schools. It is used by low percentages in MMH, ModMH, MmodMH, PH, SMH and H schools by between 40.3% and 66.3% of teachers. Database software is used by more than 61% of SD (66.7%), PS (61.5%) and MmodMH (67%) teachers. Lower usage is reported by teachers of VI (44.8%) and SOS (39.1%) schools. Presentation software is used by a particularly high proportion (more than 86%) of PH, MMH, MmodMH, SD, HI, H and PS and, at the other end of the spectrum, only 69% of VI.

Communication software is used by higher percentages of PH (82.8%) and PS teachers (82.8%) and lower percentages of SMH and SOS teachers (59% and 58.7% respectively). Web design software is also used by a higher percentage of PS teachers (67.2%) and lower percentages of H and ModMH (38.2% and 37.5% respectively). Similarly more PS teachers use audio/video editing software (69.8%) whereas the MmodMH teachers make more use of graphics editing software (83.8%). Lower use of this type of software tends to be made by the VI (50%) and H (58.2%) schools. Simulation software is used the most by MmodMH schools (48.5%) and least by VI (20.7%) and SOS (23.9%).

When it comes to the use of drill and practice software, the MmodMH teachers make the most use (75.3%) followed by MMH (71.8%), ModMH (70.8%) and the SMH, SD, PS and SOS make the least (47.6% to 50%). Again these figures must be interpreted with caution due to the small sample size.

High percentages of teachers reported that they used software developed specifically by themselves or somebody else within their schools in MMH, MmodMH, and SMH schools (64.8% to 88.8%). This occurred less than the norm in SD, HI, VI, H, PS and SOS schools (26.1% to 53.7%). High proportions of teachers reported using software developed by EMB or HKedCity in PH, MMH, ModMH, MmodMH and H schools (50% to 86.6%). Textbook publishers' software was reported to be used by high proportions of teachers from SD, HI, VI, H, PS and SOS schools (63.1% to 88.3%) but by low proportions of teachers from MMH, ModMH, MmodMH and SMH schools (15.5% to 46%), suggesting that there may not be sufficient appropriate software available for the latter group.

From Table 9.27 (Teachers' Questionnaire item 8) it can be seen quite clearly that teachers are using computers in special schools mainly for searching for information and preparing teaching materials as well as designing activities and assignments for students.

Table 9.27: Nature of use by teachers of IT in teaching-related activities (Teachers' Questionnaire, Q. 8)

Nature of use	**% of teachers choosing the option**				**N**
	Always	**Occasionally**	**Rarely**	**Never**	
Preparing teaching notes/course materials	71.5	24.1	3.5	1.0	624
Searching for information, new pedagogy, teaching materials, etc.	61.7	34.3	3.7	0.4	626
Designing inter-class activities and assignments	51.6	36.8	9.6	1.9	625
Managing, administering and collecting student tests	21.4	23.8	27.5	27.4	610
Discussing and communicating with students	7.6	26.3	36.1	30.0	617
Discussing teaching-related matters with other teachers	12.1	37.6	34.2	16.1	622
Carrying out collaborative projects with other schools	10.8	24.3	26.6	38.3	611

Similar to teachers, therapists/specialists are using computers in special schools mainly for searching for training information and preparing therapy/training materials, with more than 85% saying they occasionally or always use computers for these purposes (Table 9.28, Therapists'/Specialists' Questionnaire, item 8). 62.5% reported that they use computers for designing inter-class activities and assignments.

Table 9.3d (appended at the end of this section) shows some variation across school types in the teachers' reported use of IT in teaching-related activities. A lower than average percentage of SMH (88.1%) and H (86.6%) teachers said they use it for preparing teaching notes/course materials. High proportions of SD (64.1%) and VI (72.4%) teachers reported using it for managing, administering and collecting student tests whereas use for this purpose was particularly low for ModMH, SMH and H teachers (26.5% to 32.3%). PH and SD school teachers made high use of IT for communicating and discussing with students (46.7% and 46.2% respectively) while relatively much fewer teachers of ModMH (16%) and SMH (21%) reported using it for this purpose. The MmodMH and VI teachers appear to be the ones who make the most use of IT for discussing teaching-related matters with other teachers (60.4% and 60% respectively), while this kind of communication is less popular than the norm with teachers of HI, PS and SOS (32.8% to 37.4%).

Table 9.28: Nature of use by therapists/specialists of IT in teaching-related activities
(Therapists'/Specialists' Questionnaire, Q. 8)

Nature of use	**% of therapists/specialists choosing the option**				**N**
	Always	**Occasionally**	**Rarely**	**Never**	
Preparing teaching therapy/training materials	61.2	26.0	5.3	7.5	57
Searching for information, new pedagogy, teaching materials, etc.	39.4	46.2	10.8	3.7	57
Designing inter-class activities and assignments	29.7	32.8	16.6	20.9	56
Discussing and communicating with students	4.0	26.8	21.5	47.7	54
Discussing therapy/training-related matters with other teachers	9.4	30.0	39.9	20.7	57
Carrying out collaboration projects with other schools	14.5	17.3	12.6	55.7	56

IT definitely seems to have become a more regular part of the culture and daily routine of the teachers, therapists and specialists of special schools. However, there are still 30.8% to 49.7% of teachers and therapists/specialists using IT to communicate with students or colleagues in ways that could enhance effective collaboration. Small percentages of teachers (35.1%) and of therapists/specialists (31.8%) said they use IT to carry out collaborative projects with other schools.

When we examine further the teachers' reflections on the lessons with which they found their use of IT the most satisfying (Table 9.29, Teachers' Questionnaire item 14b), it can be seen that it is aimed towards teacher-dominated rather than student-centred learning. This observation can be viewed as similar to the case reported in the Preliminary Study. The most frequently reported use of teacher time in lessons was spent in explanation and demonstration to the whole class, with 68% saying that they did this all/most/half of the time. On the other hand, 61% of the teachers reported having spent no time or only a small proportion of their time having students working individually with computers, and 79.8% spending no or little time in having students working in groups with the computers.

From Table 9.3e (appended at the end of this section) there can be seen a few variations from the norm across school types. Higher than average proportions of teachers reported explaining and demonstrating to the whole class by SD and PS teachers (41.1% and 41.6%) and lower than average were MmodMH (19.6%), SMH (10.3%) and H (7.6%) teachers. On the other hand, higher than average proportions of H teachers (23.9%) reported having students work individually with computers.

When we look at the kind of hardware and software used by teachers in the lessons with which they were the most satisfied we can see that these are again more presentation related. This supports the perception that, even in the lessons with which teachers feel the most satisfaction about their use of IT, they are still talking about didactic types of instruction, providing very little evidence that they are supporting student-centred learning or Internet use in class. The qualitative data also support the findings from the quantitative data that the most common practices are still teacher-centred although the therapists/specialists showed a clearer sign of utilising IT for more student-centred training.

Table 9.29: Teachers' allocation of time for different purposes in their most satisfying lessons with IT application (Teachers' Questionnaire, Q. 14b)

Purposes	**% of teachers choosing the option**					**N**
	All of the time	**Most of the time**	**Half of the time**	**A small of proportion of time**	**None of the time**	
Teacher explaining and demonstrating to whole class	2.3	24.8	40.9	31.2	0.7	617
Students working individually with the computers	0.8	10.7	27.5	46.2	14.8	595
Students working in group with the computers	0.7	6.2	13.3	46.4	33.4	571

When we examine further the therapists'/specialists' reflections on the lessons with which they found their use of IT the most satisfying (Table 9.30, Therapists'/Specialists' Questionnaire item 14b), it can be seen that only 17.3% said they explain or demonstrate to the whole class all/most/half of the time. 69.8% said they let students work individually with the computers for a small proportion or none of the time and 84.8% said they worked with students in groups with computers none of the time or for a small proportion of the time.

Table 9.30: Therapists'/Specialists' allocation of time for different purposes in their most satisfying lessons with IT application (Therapists'/Specialists' Questionnaire, Q. 14b)

Purposes	**% of therapists/specialists choosing the option**					**N**
	All of the time	**Most of the time**	**Half of the time**	**A small of proportion of time**	**None of the time**	
Specialists/Therapists explaining and demonstrating to whole class	0.0	5.2	12.1	52.6	30.1	55
Students working individually with the computers	0.0	9.0	21.2	33.2	36.6	55
Students working in group with the computers	0.0	3.7	11.5	33.4	51.4	55

When asked to comment on the use of IT to cater for individual students needs (School Heads' Questionnaire item 6), 100% of the special school heads indicated that it had been used in some subjects for practice purposes or individual counseling to reinforce learning outcomes. 82.5% to 86.9% of the school heads reported having used it for tailoring for various kinds of individual differences in the classroom.

65.8% of the teachers and 52.8% of the specialists/therapists said that they had occasionally or always used IT for evaluating students' learning progress and efficacy and 63.6% of teachers and 60.8% of specialists/therapists that they had used it for processing student evaluation data (Teachers' and Therapists'/Specialists' Questionnaires items 9a). Relatively low percentages of the teachers reported that saw benefits in using IT for evaluating students (Teachers' Questionnaire item 9b). 48.6% said it allows greater flexibility in both time and place for evaluating students, 56.8% that it is easier to follow up on student evaluation, 42.5% that it is easier to relate evaluation results to students' weaknesses, 23.1% that in enables students to conduct self-review and self-evaluation on their own initiative, and 41.7% that it supplements existing evaluation tools. More teachers seemed to be aware of the benefits of using IT for processing student evaluation data (Teachers' Questionnaire item 9c): 61% saying that it is faster to obtain the evaluation results and 50.8% that it allows for more accuracy in evaluation results. However, only 46% agreed that student performance can be evaluated in greater detail, 49.2% that it is easier to follow up on student evaluations and 38.7% that it is easier to relate evaluation results and students' weaknesses. Of the therapists/specialists (Therapists'/Specialists' Questionnaire item 9b), 48.8% said that it supplements existing evaluation tools, 42.8% that it is easier to follow up on student evaluation, 30.4% that it allows greater flexibility in both time and place for evaluating students, 30.5% that it is easier to relate evaluation results to students' weaknesses, and 8.4% that in enables students to conduct self-review and self-evaluation on their own initiative. On Therapists'/Specialists' Questionnaire item 9c, 47.3% said that it is faster to obtain the evaluation results and 48.9% that it allows for more accuracy in evaluation results. However, only 31.1% agreed that student performance can be evaluated in greater detail, 40.7% that it is easier to follow up on student evaluations and 27.1% that it is easier to relate evaluation results and students' weaknesses.

9.3.4 Use of school website/intranet

On Students' Questionnaire item 14b the students reported reading announcements as the most frequent activity, although only 53.5% of the students reported doing this occasionally or always (Table 9.31). The next highest was downloading learning materials (only 36.4%). There is no evidence from students suggesting that the school website is being used in the teaching and learning process for promoting interaction or accomplishing tasks requiring higher-order thinking.

Table 9.31: Frequency of student use of school website for different purposes (Students' Questionnaire, Q. 14b)

Purposes	Response from	% of students choosing the items				N
		Always	Occasionally	Rarely	Never	
1.	Student	20.7	32.8	22.8	23.6	166
	Teacher	2.5	6.2	33.6	57.7	37
2.	Student	18.4	18.0	18.2	45.5	166
	Teacher	1.3	5.2	17.1	76.5	35
3.	Student	14.1	13.4	11.8	60.7	164
	Teacher	1.3	5.2	1.3	92.3	35
4.	Student	9.2	11.1	13.4	66.4	163
	Teacher	0.0	5.3	2.5	92.2	36
5.	Student	6.2	21.3	11.8	60.7	163
	Teacher	0.0	3.8	2.5	93.7	36
6.	Student	11.9	12.5	19.1	56.5	164
	Teacher	0.0	3.8	8.0	88.3	36

1. Reading announcements or searching for information released by the school/interest clubs
2. Downloading learning materials (e.g., notes, references, assignments, suggested answers for tests/exercises)
3. Uploading assignments/exercises
4. Participating in online tests/examinations
5. Checking the grades or feedback on your assignments given by the teachers
6. Participating in forums/discussion group

There were some differences in the patterns of students' use of school websites across school types (Table 9.3f, appended at the end of this section). Higher than average proportions of H students reported using it for all listed activities (73.1% to 77.3% saying they did this occasionally or always) except participating in forums/discussion. Higher than the average usage patterns were also reported by the SOS students for five items: downloading learning materials (45.1%), uploading assignments/exercises (59.4%) participating in online tests/examinations (31.3%), checking grades or feedback (53.7%) and participating in forums/discussion groups (44.3%) and by the SD students for downloading learning materials (41.9%), uploading assignments/exercises (41.7%), participating in online tests/examinations (30.1%), checking grades or feedback (42.5%) and participating in forums/discussions (37.3%). Higher than average proportions of HI students (63.8%) and MMH students (68.7%) reported to use the school website for reading announcements or searching for school or interest club information. The percentages of PH students reporting use of the school website were usually lower than the norm (7.2% to 19.4%), except for reading announcements and uploading assignments/exercises. The PS students were lower than the norm across all (4.4% to 41.9%) except doing online tests and participating in forums/discussion groups. There were particularly low percentages of H (2.1%) and PH (7.2%) students reporting participation in forums/discussion groups, although it seems that there is potential to use this kind of activity for students who may be isolated from the community because of their hospital stay or physical handicap. There were no teachers reporting on behalf of PH and ModMH students who indicated that their students had used school websites for any of the listed purposes. Similarly the MmodMH teachers only indicated some use by their students on two items, reading announcements/searching for information (16%) and participating in online tests and assignments (8.7%) – however the numbers of teachers responding in this category are very low. The SMH teachers reported higher than average percentages of their students having used the school website for all listed purposes (18.2% to 45.5%).

9.3.5 Perceived impact of IT on teaching

Data were collected to describe the extent to which the special school heads and teachers had perceived IT as having an impact on teaching and the curriculum. The school heads seem to have high perceptions about the impact that has occurred. The highest perceived impacts (School Heads' Questionnaire item 8d) are integrating IT into the curriculum of different subjects (92.3% of school heads saying they agreed or strongly agreed this was an impact), increased project-based and collaborative activities (83.1%), increased practicality in curriculum (81.6%) and the strengthened collaboration among different subjects (75.4%). Only 69.3% of the school heads agreed/strongly agreed that IT had facilitated curriculum integration. A relatively small proportion agreed/strongly agreed that their schools had required more adjustments to the class (30.7%) or that the use of IT had reduced teaching hours of other subjects (18.4%).

Regarding the teachers' perceptions of the changes in the school since the implementation of ITEd (Teachers' Questionnaire item 3a), 87.3% agreed or strongly agreed that more teachers in their schools use IT for teaching or assisting teaching, 78.5% that there has been a substantial improvement in the IT resources available for teachers and 72.1% that there has been a substantial improvement in the IT resources available for students. Furthermore, Teachers' Questionnaire item 3b indicates that 88.5% of the teachers said they have made more use of IT resources for teaching, 83.6% have made use of it to enhance their teaching effectiveness, 75.1% have used it to assist in teaching-related work such as processing student attendance records, but only 43.2% reported that they have requested their students to use IT in completing their assignments. Thus, again, the evidence supports that teachers are using IT but mostly for preparation and administration and teacher-centered kinds of actions, while less than half are actually requesting students to use it in their work.

9.3.6 Resources and support

As reported in Section 9.1.1, most of the schools' IT budget expenditure was on the infrastructure and technical aspects, including hardware, consumables and technical support. The high priority given to infrastructure is substantiated by very high percentages of teachers indicating a wide range of hardware and peripherals available in their schools (Table 9.32, Teachers' Questionnaire item 2a). When this is compared to the actual use, it can be seen that most of the equipment and facilities are used occasionally or always by correspondingly high percentages of teachers. The equipment that high proportions of teachers reported having access to but fewer teachers reported using includes notebook computers (59.2%

saying they used these occasionally or always), visualisers (52.2%) and CD-writers (61.5%). In the case of therapists/specialists (Table 9.33, Therapists'/Specialists' Questionnaire item 2a), high proportions reported having access to the full range of hardware and peripherals (with the exception of notebook computers to take home) but fewer report the use of notebook computers (33.1% saying they used these occasionally or always), visualisers (49.3%), CD-writers (43%), educational software (40.2%) and online teaching or learning platforms (27.3%).

From Table 9.3g (appended at the end of this section) it can be seen that higher than average percentages of the MMH and SMH teachers reported making use of a range of IT facilities, although there do not appear to be many particular uses that can be explained by the actual types of schools. More of the SMH and PH teachers reported making use of digital cameras/video cameras occasionally or always (91.3% and 89.6%). 100% of the PH and ModMH teachers said they used coloured printers. The visualiser was reported to be used by more teachers of PH, MmodMH and SMH (67.4% to 73.3%) and online teaching/learning platforms by MMH, MmodMH, SMH and SD teachers (85.6% to 88.2%). There may be some implication here that more suitable online materials are available for these special areas. On the other hand, VI and H teachers were among the lowest reporting use of a range of facilities including notebook computers (VI only), digital/video cameras, visualisers, CD writers and online teaching/learning platforms (23.1% to 48.3%).

From Table 9.3h it can be seen that 100% of the HI therapists/specialists reported occasionally/always using most of the listed items, except visualisers and educational software. In addition, high use of Email was reported by MmodMH therapists/specialists (77.8%); high usage of digital/video cameras by PH, MmodMH and SMH (87.5% to 93.3%); colour printer by 100% of PH, ModMH and MmodMH; visualiser by PH (53.3%) and SMH (66.6%); CD writer by ModMH (60%) and SMH (63.2%); educational software by MmodMH (75%); and online teaching/learning platform by MmodMH (57.2%). Lower than average percentages reported use of: notebook computer in school by PH (20%) and MmodMH (25%); no therapists/specialists in PH, ModMH and SMH claimed for using notebook computer at home; Email account provided by school by PH (40%); digital/video camera by MMH (62.5%) and ModMH (60%); black and white printer by ModMH (75%); colour printer by MMH (62.5%) and SMH (75%); visualiser by MMH (28.6%); CD writer by PH, MMH and MmodMH (12.5% to 33.3%); educational software by PH (26.7%); and online teaching/learning platform by MMH (16.7%).

Table 9.32: Availability and extent of use of IT facilities/services by teachers in schools (Teachers' Questionnaire, Q. 2a)

Facilities/Services	**% of teachers indicating availability**	**N**	**Extent of use in previous year**				
			% of teachers choosing the option				**N**
			Always	**Occasionally**	**Rarely**	**Never**	
Desktop computer	98.2	620	88.8	8.5	2.3	0.4	590
Notebook computer (for use in school)	92.1	615	27.1	32.1	29.6	11.2	554
Notebook computer (for take-home use)	41.2	587	14.3	11.9	23.6	50.3	245
Internet	99.0	621	83.5	14.4	1.9	0.3	593
E-mail account provided by school	92.4	621	48.1	23.2	19.7	9.0	563
File server storage space	98.8	616	83.0	12.7	3.5	0.8	577
Digital camera/video camera	98.1	621	30.8	45.0	19.6	4.6	579
Printer (black-and-white)	98.0	622	89.5	8.5	2.0	0.1	585
Printer (colour)	99.3	625	60.6	30.0	9.2	0.3	598
Visualiser	81.6	613	20.2	32.0	32.8	15.0	487
CD Writer	98.2	620	14.1	47.4	30.0	8.5	590
Educational Software	98.5	619	41.2	45.1	11.8	1.9	591
Online teaching/learning platform	76.5	592	28.9	45.6	19.9	5.6	447

Table 9.33: Availability and extent of use of IT facilities/services by therapists/specialists in schools (Therapists'/Specialists' Questionnaire, Q. 2a)

Facilities/Services	% of therapists/ specialists indicating availability	N	Extent of use in previous year				
			% of therapists/specialists choosing the option				N
			Always	Occasionally	Rarely	Never	
Desktop computer	98.2	58	92.3	5.7	0.0	2.0	57
Notebook computer (for use in school)	95.3	58	5.7	27.4	45.5	21.5	55
Notebook computer (for take-home use)	24.1	57	0.0	4.5	40.0	55.5	12
Internet	100.0	58	79.2	15.6	5.3	0.0	58
E-mail account provided by school	85.8	58	43.6	16.2	14.2	26.0	50
File server storage space	98.3	57	88.7	9.5	1.9	0.0	55
Digital camera/video camera	100.0	58	31.2	51.8	13.8	3.3	57
Printer (black-and-white)	97.8	58	90.2	7.0	2.8	0.0	57
Printer (colour)	98.3	58	61.5	23.6	13.2	1.8	56
Visualiser	79.3	58	4.1	45.2	31.6	19.1	47
CD Writer	96.5	58	6.0	37.0	35.9	21.1	56
Educational Software	98.2	58	3.8	36.4	41.7	18.1	56
Online teaching/learning platform	70.9	55	3.0	24.3	39.4	33.4	37

When teachers were asked to rate the sufficiency of the school's IT facilities to support their teaching (Teachers' Questionnaire item 2b), it was found that 46.9% to 81.9% indicated that it was quite or very sufficient. The item which the fewest respondents rated as quite/very sufficient was curriculum support. Actually, a similar picture can be seen from the students' perceptions of the same facilities. (Students' Questionnaire item 5). Higher percentages of students think computer (2.6%) and technical support (67.7%) are sufficient facilities in the school while other facilities were rated as such by only 49.6% to 61.3% of the student respondents.

When the teachers were asked to identify the resources and support services they had used (Teachers' Questionnaire item 5), the highest proportion mentioned that they had used HKedCity (76.9%, of whom 77.8% reported that they were satisfied/very satisfied). The next highest was Technical Support Service (only 40.4%, although 74.8% of these reported that they were satisfied/very satisfied). For the therapists/specialists (Therapists'/Specialists Questionnaire item 5) the highest proportion also reported use of HKedCity but this was considerably less than the teachers (39% of whom 63.1% reported they were satisfied/very satisfied).

When asked to identify their main sources of support when they encounter difficulties in using IT (Teachers' Questionnaire item 7), the majority of teachers indicated school-based technical support (74.3%), IT coordinator (71.2%), IT team members (72%), friends and relatives (56.2%) or other colleagues (72.8%) rather than turning to other sources such as self-help strategies (35.4%) or EMB (1.6%). This finding shows a similar pattern to that reported in the Preliminary Study. In the Preliminary Study, the teachers indicated that they prefer to seek help from colleagues, IT coordinator, computer studies teachers, and friends. Students also indicated that most of their support comes from their teachers (90.1%), classmates and friends (59.7%) and relatives (54.5%), and IT technicians at school (55.3%) (Students' Questionnaire item 25). Students' responses suggested that the highest expectation for support was from their teachers, and a reasonable level of satisfaction was also reported.

9.3.7 Needs and obstacles

The school heads' questionnaire data (Table 9.34, School Heads' Questionnaire item 18) suggest that the greatest support need in special schools is for increasing the amount of/upgrading educational software and IT teaching resources (92.5% rating this as quite or much in need). This is followed by increasing the amount of/upgrading computer peripherals (84.8%) and integrating IT into the school curriculum (84.8%). This may imply that resourcing is still perceived by school heads as one of the major concerns. High percentages of school heads also rated using IT to support students with learning difficulties (83.4%), using IT for performing school administration/management tasks (83.4%), using IT in teaching or assisting teaching (81.8%) and increasing the number of/upgrading computers (80.3%). Relatively low priority was given to supporting developments that would lead to greater collaboration between schools, with the lowest ratings given to sharing experiences with teachers (56.1%) and students (25.8%) from other schools.

There are a few cases shown in Table 9.3i (appended at the end of this section) in which school heads from different school types rated higher than the overall mean for some aspects of support needs. These include: PH schools, using IT to support students with learning difficulties and to provide therapy or training (both 3.7); MMH schools, sharing experiences with students from other schools (2.3), increasing/upgrading computers (3.8) and peripherals (3.8); SMH schools, using IT to support school administration/management tasks (3.7); HI schools, enhancing students' IT skills (3.5), sharing experiences with students from other schools (2.8); VI schools, increasing the amount of/upgrading educational software and IT teaching resources (4.0), using IT to provide therapy or training (4.0) and PS schools, integrating IT into the school curriculum and using IT in teaching/assisting teaching (both 3.5). The SMH school heads were obviously less concerned than others about enhancing the students' IT skills (2.2) and sharing experiences with students from other schools (0.9). The SD school heads gave lower than average mean ratings for using IT for school administration/management (2.3) and also for increasing/upgrading computers and peripherals (both 2.6) as well as using IT to provide therapy or training (1.4). The PS school heads had lower than average mean ratings on several items that included sharing experiences with teachers (2.0) and students (1.0) from other schools. The SOS heads were also less concerned with several items that included increasing/upgrading computers and peripherals (2.1 and 2.4).

Table 9.34: Heads' ratings of support needs in schools (School Heads' Questionnaire, Q. 18)

Needs	Mean (0–4)	SD	N	% of heads choosing the option				
				Much in need	Quite in need	Average	Not much need	No need at all
Integrating IT into the school curriculum	3.0	0.8	66	24.2	60.6	12.1	1.5	1.5
Using IT in teaching/assisting teaching	3.0	0.8	66	24.2	57.6	13.6	3.0	1.5
Enhancing the IT skills of students	2.7	0.9	66	19.7	42.4	28.8	7.6	1.5
Enhancing the IT skills of teachers	3.0	0.9	66	31.8	37.9	27.3	3.0	0.0
Sharing experiences with teachers from other schools	2.6	0.9	66	15.2	40.9	33.3	10.6	0.0
Sharing experiences with students from other schools	1.7	1.1	66	4.6	21.2	28.8	31.8	13.6
Using IT for performing/supporting school administration/management tasks	3.2	0.8	66	37.9	45.5	12.1	4.6	0.0
Increasing the number of/upgrading computers	3.2	0.9	66	42.4	37.9	12.1	7.6	0.0
Increasing the amount of/upgrading computer peripherals	3.2	0.8	66	40.9	43.9	9.1	6.1	0.0
Increasing the number of network nodes in school	2.8	1.1	66	31.8	33.3	21.2	10.6	3.0
Increasing the amount of/upgrading educational software and IT teaching resources	3.4	0.7	66	47.0	45.5	6.1	1.5	0.0
Using IT to support students with learning difficulties	3.1	0.7	66	28.8	54.6	15.2	1.5	0.0
Using IT to provide additional materials to supplement the curriculum for gifted students	2.8	1.0	65	23.1	46.2	18.5	9.2	3.1

From the perspective of the IT team members (Table 9.35, IT Team Members' Questionnaire item 5) the pattern is similar to that of the school heads. The highest percentage rated increasing/upgrading software and IT teaching resources as quite/much in need (90.9%), followed by increasing/upgrading peripherals (78.8%) and enhancing the IT skills of teachers (73.9%). Again the lowest percentages identified sharing experiences with teachers (55.6%) and students (29.7%) from other schools as being important needs.

Table 9.35: IT team members' ratings of support needs in schools (IT team members' Questionnaire, Q. 5)

Needs for support in school	Mean (0-4)	SE	N	% of IT team members choosing the option				
				Much in need	Quite in need	Average	Not much need	No need at all
Integrating IT into the school curriculum	2.9	0.09	102	20.7	50.5	25.8	1.7	1.3
Using IT in teaching/assisting teaching	2.9	0.10	102	25.2	45.4	20.4	7.7	1.3
Enhancing the IT skills of students	2.8	0.10	101	19.5	50.0	22.5	3.5	4.5
Enhancing the IT skills of teachers	3.0	0.07	102	28.4	45.5	21.6	3.5	0.9
Sharing experiences with teachers from other schools	2.5	0.08	102	5.8	49.8	33.1	9.8	1.5
Sharing experiences with students from other schools	2.0	0.07	102	6.3	23.4	35.3	29.8	5.2
Using IT for performing/supporting school administration/management tasks	2.9	0.11	102	28.4	38.7	22.5	10.4	0.0
Increasing the number of/upgrading computers	3.1	0.11	102	40.4	30.6	24.6	3.2	1.3
Increasing the amount of/upgrading computer peripherals	3.1	0.08	102	39.4	39.4	19.4	0.6	1.3
Increasing the number of network nodes in school	3.0	0.09	101	38.0	28.9	23.8	9.4	0.0
Increasing the amount of/upgrading educational software and IT teaching resources	3.4	0.05	102	44.3	46.6	9.1	0.0	0.0
Using IT to support students with learning difficulties	2.9	0.09	101	29.1	42.7	19.0	7.1	2.2

Table 9.3j (appended at the end of this section) shows that the VI school IT team members had higher than average mean ratings for nine obstacles: integrating IT into the school curriculum (3.3), using IT to enhance teaching (3.3), enhancing students' IT skills (3.3), using IT to support students with learning difficulties (3.5), sharing experiences with teachers (3.0) and students (2.8) from other schools, using IT for school administration/management (3.5), and increasing/upgrading the numbers of computers and peripherals (both 3.8). The H school IT team members rated using IT in teaching/assisting teaching (3.4), enhancing the IT skills of teachers (3.4), using IT to support students with learning difficulties (3.6), increasing/upgrading peripherals (3.7) and network nodes (3.4) as higher than the norm and the PS IT team members gave a higher rating for integrating IT into the school curriculum (3.3)

From Table 9.3k we can see that the teachers with the most above average ratings of obstacles and needs were those from the PH, SMH and H schools. Items on which higher than average PH teachers reported serious/very serious problems include lack of suitable professional development courses that meet their needs (69%), lack of clear school objectives (52%), insufficient computer rooms (66.7%) and lack of suitable assistive devices (82.8%). This last was also reported as serious/very serious by the SMH (86%) teachers. For the SMH teachers the other items of most interest rated by high percentages are lack of interest in using IT (45.6%), lack of appropriate professional development courses to meet their needs (65.5%), and the curriculum is not conducive to using IT (61.4%). For the H teachers the items of most interest are lack of knowledge/skills to apply IT in teaching (77.6%), lack of interest in using IT (50%), insufficient facilities in the classroom (71.9%) and the unsuitability of the curriculum for using IT (62.7%). On nearly all items, lower than average percentages of the MmodMH, SD, HI, VI, PS and SOS teachers rated as serious or very serious problems. From Table 9.3*l* it appears that the ModMH therapists/specialists are the group with higher than average proportions identifying the largest number of obstacles. Included amongst these are workload, time needed to prepare IT materials or participate in professional development, lack of appropriate professional development opportunities and the existing therapy/training being not conducive to using IT (all 100%). Other than these, they were generally concerned with, lack of interest to use IT (40%) and insufficient facilities (40% to 80%). The SMH therapists/specialists also had high indications of workload (95%), lack of knowledge/skills (85%), lack of schemes, objectives and technical support in their schools (65% to 70%) and insufficient IT peripherals (75%).

9.3.8 Findings from the qualitative data

Teachers' pedagogical use was reflected from the classroom observations. This can shed some further light on teachers' classroom practices in using IT. Of the 40 classes visited, 34 were using computers in one way or another (see Table 9.36 for a breakdown of the classes observed by subject. Of these, teachers were using the Internet in 10 and the students in only 3. In all cases the teachers were the predominant users. In one PS school there were 20 computers being used by students in one class. There were also three classes in which computers were observed being used by students in MMH schools, one class in a MmodMH school and one class in a Hospital school.

Table 9.36: Breakdown of classes observed by subject (special schools)

Subjects	No. of classes observed	No. of classes observed with use of IT
English	4	4
Chinese	5	5
Mathematics	8	7
General Studies	1	1
Computer/IT	2	2
Geography	1	1
Music	3	1
Chinese History	1	1
Perceptual Motor Training	1	1
Workshop Training	1	1
Self-Care Training (Eating)	2	2
Independent Living Skills	1	1
Physical Education	2	1
Communication	1	0
Daily Living Skills Training	2	2
Office Practice	1	1
Design and Technology	1	0
Interesting Group	2	2
Project	1	1
Total	**40**	**34**

In the classroom visits there were several examples observed of teachers having designed specific programmes for students and there was some evidence of IT being used in curriculum areas including PE (teaching football skills); Geography (showing the texture of rocks); Bible stories (applying in daily life/moral education); Mathematics (using simple but interesting games and exercises). IT was also observed being applied in mass media; including weather forecasting and showing graphs. The students were seen to be keen to use IT and it appeared to be effective in capturing their attention. It was particularly observed that SMH students paid much more attention when using IT.

A typical teacher-led lesson involved the use of IT for presentation, with some interaction with the students in the form of responding to questions. However there was little direct student-computer interaction. Once students had hands-on access during the observed lessons, the main usage was for drawing or creative designing responding to questions, repetitious games to reinforce concepts or using spreadsheets. There were classes in which the students were engaged in searching for information on the Internet. In summary, there was very little evidence of IT being used as a tool to support the needs of special school students in any specific or innovative ways.

In the interviews with teachers and therapists it was mentioned that the ways in which IT is used basically depends on the students and the degree and nature of the disabilities. Most use it for knowledge transmission. Sometimes the teachers and therapists provide individual exercises for students, and those students who can manage to do tasks independently are given them to do at home. They mentioned that they cannot find the resources easily in Hong Kong. When they mentioned the different kinds of constraints they face, it appears that they very much want to have the devices and software but they are frustrated that these are not easily available.

Most of the teachers said that they search for information from the Internet and make it into PowerPoint presentations, etc. Some mentioned in the teachers' interviews that IT has been integrated into music and social science subjects. For example, teachers sometimes take MH students out to a supermarket. They use digital cameras to take photographs of the environment and show it to the students to brief them properly before taking them out. IT is also used to document students' classroom performance which will be shown to parents and students. Students and parents are both very happy with this. It is interesting to note that school heads opined that IT is not necessarily the most appropriate way to teach everything, despite the benefits of using it to provide more effective repetition and stimuli than other media. For example, when teaching concepts such as smell or texture, it is necessary to give students access to the real objects rather than to use IT. One school head admitted that it is not easy to achieve the target of using 25% of IT in some of the subjects such as P.E., Music, Home Economics and Cognitive Science. If this target is adhered to strictly, it may affect the normal arrangement of the teaching progress. In summary, teachers gave a sense of not being as mature as primary and secondary teachers in their use of IT because they did not as readily quote the applications or projects they were using.

In a group interview, PH students reported that they did not know how to use IT facilities even though there is enough/sufficient IT support. They expect to have more instructions and guidance in computer-usage, to choose the most suitable and useful websites, and to distinguish the appropriate resources or learning materials. Regarding the purposes of using IT for students, they wish to use it but they do not know how to use it and why they need to use it.

Support and resources

Some of the teachers in the focus group interviews commented that there is not much training for special schools, although others mentioned they have downloaded some information for preparation of teaching materials from HKedCity. Similar to the primary and secondary schools, they said they think HKedCity is a good idea and should be developed further so teachers can have much richer access to resources. But there is not too much available there for special schools right now. For example, sound systems and visual facilitation of IT should be ready for Visually Impaired students. There is a need to design software which can have increase the size of the text. However, the present system and software usually cannot match with the needs of the students.

As the support service for special schools by EMB has been restructured, teachers perceived a reduction in support because the provision of support for special schools has been deployed to each region. The teachers also mentioned in interviews that they now feel as if they are isolated/ignored because there are few people who really understand the needs of special schools.

As teachers are not usually professionals in IT, many teachers think that schools can recruit more IT specialists and technicians. They themselves do not have enough time and are not able to design some highly technological software such as flash and animation. One teacher advised that IT is only a tool to facilitate teaching. The most important thing is to adapt IT in teaching effectively and naturally. Teachers said they do not need to spend too much time with students with higher ability. Instead, they would rather give more support to the lower-ability students. They also voiced some constraints that should be overcome. These included the lower competency or ability of the special students and IT deficiency (e.g., computers or other facilities) in poor families. There is a great demand for IT resources in special schools, for example special devices.

Specialists/therapists expressed a great need for IT resources and support in the special sector. One therapist said that IT is only an assistive tool in therapy provision. The most important thing is the personal involvement, that is the need to respond immediately during the therapy as it needs interaction and mutual understanding on the parts of both the therapists and the students. However, she/he still claimed the need for IT during the therapy.

Teachers and therapists show that using IT can enrich their work to a certain extent. Some students feel that using IT can let them reach and touch the outside world easily. They would like to search for online information which is most up to date. Furthermore, students can develop personal interest by specifying meaningful and interesting topics to learn. Most likely, students use computers to play online or learning-related games. In addition, some students have positive views of their future thanks to the use of computers. It is believed that ITEd for students is fun-related and stimulus-based. Moreover, parents may be the dominant motivators for students. Parental involvement is an essential element in motivating students to learn. Students reported that they had IT facilities at home but they felt that provision was not sufficient in the community and public libraries in which special needs are not served satisfactorily. Time limitation in using or practising is another obstacle to applying IT in learning. Students reflected that the opening hours were too short or they had to leave school at once after lessons. So they hope to have longer opening hours for extending the possible using time in schools but they understand this is determined by the schools. It is reported that Hospital School students did not have enough time to use computers. This is a school-typed specific case. Besides, MmodMH students also show that they do not have sufficient time for using computers in schools.

Another point is concerned with the priority usage by students at home. This is relatively low for special school students. Computer facilities are usually used by other family members when they are needed by special students. Special students have little power to occupy the IT facilities, especially when other relatives do not let them have access very often. There is a resistance to their “educational need”. This reflects that some families may not cater for the special needs of their children.

Table 9.3a: Teachers' primary objectives for using IT in teaching (Teachers' Questionnaire, Q. 11)

	Overall			**PH**			**MMH**			**ModMH**			**MmodMH**			**SMH**			**SD**			**HI**			**VI**			**H**			**PS**			**SOS**		
	M	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**
a.	2.6	0.04	607	2.7	0.09	27	2.4	0.18	69	2.5	0.06	49	2.7	0.13	96	2.3	0.02	56	2.8	0.08	37	2.7	0.02	66	2.5	0.00	30	2.7	0.00	67	2.5	0.02	64	2.6	0.14	46
b.	3.1	0.02	619	3.4	0.00	28	3.2	0.05	71	3.1	0.03	50	3.2	0.04	99	3.0	0.14	56	3.2	0.10	40	3.0	0.01	67	3.1	0.00	30	3.0	0.00	68	2.9	0.13	64	2.7	0.08	46
c.	2.2	0.05	607	2.5	0.17	27	2.4	0.09	70	1.8	0.11	48	2.4	0.05	97	1.7	0.16	54	2.5	0.16	39	2.4	0.02	66	2.5	0.00	30	2.3	0.00	67	2.3	0.06	64	2.4	0.24	45
d.	2.4	0.05	611	2.5	0.09	28	2.4	0.04	71	2.0	0.11	48	2.5	0.07	98	2.0	0.23	56	2.7	0.08	38	2.5	0.00	67	2.6	0.00	30	2.4	0.00	67	2.3	0.03	64	2.5	0.04	44
e.	2.3	0.05	607	2.5	0.21	28	2.5	0.07	71	1.8	0.09	48	2.4	0.07	97	1.9	0.12	54	2.6	0.07	38	2.5	0.10	67	2.8	0.00	29	2.4	0.00	67	2.3	0.05	63	2.4	0.24	45
f.	2.3	0.04	606	2.4	0.11	27	2.6	0.09	71	2.1	0.12	48	2.6	0.06	98	2.3	0.18	55	2.4	0.07	37	2.3	0.07	66	2.5	0.00	29	2.1	0.00	67	2.2	0.04	63	2.1	0.16	45
g.	2.9	0.05	616	3.0	0.21	29	3.1	0.06	70	2.7	0.09	50	3.2	0.06	99	2.0	0.24	57	2.8	0.12	38	3.0	0.00	67	3.2	0.00	29	3.1	0.00	68	2.9	0.08	63	2.8	0.13	46
h.	2.4	0.05	601	2.7	0.02	27	2.5	0.10	70	2.1	0.07	47	2.6	0.06	95	1.9	0.28	53	2.6	0.13	38	2.6	0.03	66	2.7	0.00	29	2.7	0.00	68	2.5	0.01	63	2.5	0.18	45
i.	3.0	0.04	600	3.3	0.16	28	3.2	0.06	69	3.2	0.04	49	3.1	0.03	96	2.9	0.22	54	2.8	0.04	37	2.9	0.01	65	3.2	0.00	27	3.2	0.00	68	2.6	0.12	61	2.9	0.23	46

Objectives
a. To realise effects that can only be achieved by using IT
b. To enhance teaching effectiveness
c. To strengthen communication among students
d. To provide more opportunities for student to work collaboratively
e. To strengthen communication between teachers and students
f. To strengthen communication between the school and parents
g. To provide students with more opportunities for self-learning
h. To provide students with more opportunities for self-assessment
i. To assist students with learning difficulties or special education needs by specifically designed software/hardware

Table 9.3b: Therapists'/Specialists' primary objectives for using IT in therapy/training (Therapists'/Specialists' Questionnaire, Q. 11)

	Overall			**PH**			**MMH**			**ModMH**			**MmodMH**			**SMH**			**SD**			**HI**			**VI**			**H**			**PS**			**SOS**		
	M	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**
a.	2.5	0.18	55	2.4	0.66	14	2.1	0.14	7	3.0	0.00	5	2.3	0.19	9	2.5	0.06	19	-	-	-	3.0	-	1	-	-	-	-	-	-	-	-	-	-	-	-
b.	2.6	0.17	55	2.6	0.48	14	2.7	0.27	7	2.6	0.49	5	3.1	0.21	9	2.4	0.21	19	-	-	-	3.0	-	1	-	-	-	-	-	-	-	-	-	-	-	-
c.	1.7	0.13	55	2.0	0.12	14	2.1	0.58	7	1.4	0.49	5	1.8	0.06	9	1.4	0.07	19	-	-	-	3.0	-	1	-	-	-	-	-	-	-	-	-	-	-	-
d.	1.9	0.13	55	2.1	0.18	14	2.1	0.58	7	1.8	0.46	5	2.0	0.15	9	1.6	0.14	19	-	-	-	2.0	-	1	-	-	-	-	-	-	-	-	-	-	-	-
e.	1.8	0.07	55	2.0	0.12	14	1.7	0.27	7	1.6	0.32	5	2.0	0.15	9	1.6	0.10	19	-	-	-	3.0	-	1	-	-	-	-	-	-	-	-	-	-	-	-
f.	2.2	0.11	56	2.1	0.30	14	1.9	0.14	7	2.4	0.11	5	2.2	0.14	9	2.3	0.20	20	-	-	-	3.0	-	1	-	-	-	-	-	-	-	-	-	-	-	-
g.	2.3	0.14	55	2.7	0.36	14	2.3	0.03	7	3.2	0.32	5	2.7	0.26	9	1.7	0.18	19	-	-	-	3.0	-	1	-	-	-	-	-	-	-	-	-	-	-	-
h.	2.0	0.11	54	2.3	0.24	14	2.1	0.14	7	2.5	0.33	4	2.0	0.15	9	1.5	0.18	19	-	-	-	2.0	-	1	-	-	-	-	-	-	-	-	-	-	-	-
i.	3.0	0.17	53	3.4	0.54	14	3.0	0.00	5	2.8	0.37	5	3.0	0.15	9	2.8	0.25	19	-	-	-	3.0	-	1	-	-	-	-	-	-	-	-	-	-	-	-

Objectives

a. To realise effects that can only be achieved by using IT
b. To enhance therapy/training effectiveness
c. To strengthen communication among students
d. To provide more opportunities for student to work collaboratively
e. To strengthen communication between therapists/specialists and students
f. To strengthen communication between the school and parents
g. To provide students with more opportunities for self-learning
h. To provide students with more opportunities for self-assessment
i. To assist students with learning difficulties or special education needs by specifically designed software/hardware

Table 9.3c: Frequency of software used in teaching reported by teachers (Teachers' Questionnaire, Q. 12)

	Overall		PH		MMH		ModMH		MmodMH		SMH		SD		HI		VI		H		PS		SOS	
	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
a.	95.3	624	100.0	30	94.4	72	98.1	51	93.8	98	82.7	58	94.9	39	100.0	67	96.8	31	95.6	68	98.5	64	100.0	46
b.	63.3	615	48.3	29	54.2	72	53.2	47	66.3	98	40.3	57	76.9	39	80.6	67	75.0	28	50.0	68	90.6	64	82.7	46
c.	55.3	619	51.7	29	51.4	72	57.1	49	67.0	97	52.5	59	66.7	39	56.7	67	44.8	29	50.7	67	61.5	65	39.1	46
d.	84.3	616	93.1	29	87.5	72	72.3	47	88.9	99	79.0	57	89.2	37	95.6	67	69.0	29	86.8	68	90.8	65	76.1	46
e.	69.8	607	82.8	29	70.0	70	65.2	46	73.2	97	59.0	56	72.2	36	79.1	67	69.0	29	64.2	67	82.8	64	58.7	46
f.	50.6	615	48.3	29	58.3	72	37.5	48	52.0	98	55.2	58	45.9	37	55.2	67	44.8	29	38.2	68	67.2	64	44.4	45
g.	56.9	616	56.7	30	54.2	72	57.2	49	58.8	97	65.5	58	62.1	37	55.2	67	51.7	29	41.2	68	69.8	63	43.5	46
h.	75.3	614	79.3	29	71.8	71	77.1	48	83.8	99	79.3	58	75.7	37	76.1	67	50.0	28	58.2	67	78.1	64	67.4	46
i.	83.0	619	93.1	29	81.9	72	81.6	49	82.8	99	86.3	58	81.6	38	85.1	67	65.5	29	79.4	68	87.6	64	76.1	46
j.	37.7	611	34.5	29	34.3	70	40.4	47	48.5	99	45.6	57	37.8	37	33.4	66	20.7	29	29.4	68	41.3	63	23.9	46
k.	61.3	610	65.5	29	71.8	71	70.8	48	75.3	97	49.1	55	50.0	38	56.1	66	51.7	29	66.2	68	47.6	63	47.8	46
l.	63.2	618	65.5	29	88.8	71	61.2	49	80.8	99	79.7	59	45.9	37	53.7	67	41.3	29	44.1	68	35.9	64	37.0	46
m.	56.6	616	48.2	29	64.8	71	83.7	49	79.6	98	69.0	58	29.7	37	40.3	67	34.4	29	36.8	68	36.0	64	26.1	46
n.	48.7	612	50.0	28	57.2	70	61.8	47	65.3	98	39.6	58	43.2	37	37.3	67	44.8	29	69.1	68	36.0	64	21.8	46
o.	68.0	618	86.6	30	84.7	72	70.8	48	84.7	98	51.7	58	65.8	38	68.2	66	50.0	30	72.0	68	42.2	64	47.8	46
p.	49.1	614	62.0	29	58.4	72	56.2	48	63.9	97	22.4	58	48.6	37	43.3	67	44.8	29	62.7	67	32.9	64	41.3	46
q.	52.8	615	60.7	28	44.5	72	31.3	48	46.0	98	15.5	58	83.8	37	86.6	67	72.4	29	88.3	68	71.9	64	63.1	46
r.	50.8	608	60.7	28	45.7	70	52.1	48	52.0	98	29.3	58	64.9	37	62.2	66	51.8	27	77.9	68	50.0	64	45.5	44

Software
a. Word processing software
b. Spreadsheet software
c. Database software
d. Presentation software
e. Communication software
f. Web design software
g. Audio/video editing software
h. Graphics editing/drawing software
i. Multi-media software
j. Simulation software
k. Practice and drill software
l. Educational software developed by yourself
m. Educational software developed by your school
n. Educational software developed by EMB (Formerly ED)
o. Educational software or teaching materials obtained from HKedCity (HKedCity.net)
p. Educational software developed by other government departments/voluntary organizations/tertiary institutions
q. Educational software provided by textbook publishers
r. Educational software developed by other software vendors
%=percentage of choosing options of 'always' or 'occasionally'; N= Total number of teachers

Table 9.3d: Nature of use by teachers of IT in teaching-related activities (Teachers' Questionnaire, Q. 8)

	Overall		PH		MMH		ModMH		MmodMH		SMH		SD		HI		VI		H		PS		SOS	
	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
a.	95.6	624	100.0	30	97.2	72	95.9	49	98.0	100	88.1	59	94.9	39	100.0	67	90.0	30	86.6	67	97.0	65	95.7	46
b.	96.0	626	90.0	30	98.7	72	98.1	51	100.0	101	94.9	59	95.0	40	97.1	67	93.3	30	94.0	67	95.3	64	91.2	45
c.	88.4	625	93.4	30	88.9	72	98.0	51	90.0	100	86.5	59	82.5	40	92.5	67	69.0	29	77.6	67	76.6	64	89.1	46
d.	45.2	610	46.4	28	47.2	70	26.5	49	48.4	99	26.8	56	64.1	39	47.8	67	72.4	29	32.3	62	63.1	65	56.6	46
e.	33.9	617	46.7	30	42.1	69	16.0	50	37.7	101	21.0	57	46.2	39	40.3	67	41.4	29	31.8	66	31.3	64	37.8	45
f.	49.7	622	55.2	29	53.6	71	52.0	50	60.4	101	59.3	59	50.0	40	37.4	67	60.0	30	47.0	66	32.8	64	33.3	45
g.	35.1	611	24.1	29	38.6	70	40.4	47	43.0	100	39.6	58	33.4	39	28.4	67	24.1	29	24.3	66	29.1	62	31.8	44

Nature of use
a. Preparing teaching notes/course materials
b. Searching for information, new pedagogy, teaching materials, etc.
c. Designing inter-class activities and assignments
d. Managing, administering and collecting student tests
e. Discussing and communicating with students
f. Discussing teaching-related matters with other teachers
g. Carrying out collaborative projects with other schools
%=percentage of choosing options of 'always' or 'occasionally'; N= Total number of teachers

Table 9.3e: Teachers' allocation of time for different purposes in their most satisfying lessons with IT application (Teachers' Questionnaire, Q. 14b)

	Overall		PH		MMH		ModMH		MmodMH		SMH		SD		HI		VI		H		PS		SOS	
	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
a.	27.1	617	32.1	28	36.1	72	30.0	50	19.6	97	10.3	58	41.1	39	28.8	66	30.0	30	7.6	66	41.6	65	23.9	46
b.	11.5	595	7.8	26	11.8	68	17.0	47	7.3	96	14.6	55	15.8	38	9.4	64	17.9	28	23.9	67	4.9	61	6.7	45
c.	6.9	571	13.1	23	10.6	66	2.3	43	6.4	94	5.6	54	13.5	37	3.2	62	16.0	25	11.3	62	6.7	60	2.2	45

Purposes
a. Teacher explaining and demonstrating to whole class
b. Students working individually with the computers
c. Students working in groups with the computers
%=percentage of choosing options of 'all of the time" or 'most of the time'; N= Total number of teachers

Table 9.3f: Frequency of student use of school website for different purposes (Students' Questionnaire, Q. 14b)

	Teacher answered									
	Overall		PH		ModMH		MmodMH		SMH	
	%	N	%	N	%	N	%	N	%	N
1.	8.7	37	0.0	2	0.0	11	16.0	13	27.3	11
2.	6.5	35	0.0	0	0.0	11	0.0	13	45.5	11
3.	6.5	35	0.0	0	0.0	11	0.0	13	45.5	11
4.	5.3	36	0.0	1	0.0	11	8.7	13	18.2	11
5.	3.8	36	0.0	1	0.0	11	0.0	13	27.3	11
6.	3.8	36	0.0	1	0.0	11	0.0	13	27.3	11

	Student answered																							
	Overall		PH		MMH		ModMH		MmodMH		SMH		SD		HI		VI		H		PS		SOS	
	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
1.	53.5	166	48.2	12	68.7	24	-	-	36.4	16	-	-	47.0	24	63.8	27	0.0	9	77.3	12	41.9	22	49.0	20
2.	36.4	166	19.4	12	31.6	23	-	-	43.0	16	-	-	41.9	24	41.7	26	0.0	8	75.1	12	16.2	22	45.1	23
3.	27.5	164	19.4	12	13.8	23	-	-	11.6	16	-	-	41.7	24	30.5	27	0.0	6	73.1	12	11.7	22	59.4	22
4.	20.3	163	7.2	12	11.1	23	-	-	11.4	16	-	-	30.1	24	24.6	27	0.0	6	75.2	12	21.2	22	31.3	21
5.	27.5	163	7.2	12	13.0	22	-	-	31.4	16	-	-	42.5	24	24.5	27	0.0	6	73.1	12	4.4	22	53.7	22
6.	24.4	164	7.2	12	19.3	23	-	-	28.6	16	-	-	37.3	24	15.4	27	0.0	6	2.1	12	20.7	22	44.3	22

Purposes

1. Reading announcements or searching for information released by the school/interest clubs
2. Downloading learning materials (e.g., notes, references, assignments, suggested answers for tests/exercises)
3. Uploading assignments/exercises
4. Participating in online tests/examinations
5. Checking the grades or feedback on your assignments given by the teachers
6. Participating in forums/discussion groups
%=percentage of choosing options of 'always' or 'occasionally'; N= Total number of teachers

Table 9.3g: Availability and extent of use of IT facilities/services by teachers in schools (Teachers' Questionnaire, Q. 2a)

	Overall		PH		MMH		ModMH		MmodMH		SMH		SD		HI		VI		H		PS		SOS	
	%	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**
a.	97.3	590	96.4	28	97.0	67	100.0	48	95.8	95	100.0	57	100.0	39	96.9	64	96.5	29	79.3	58	100.0	61	97.8	44
b.	59.2	554	55.2	29	58.5	65	53.7	41	56.1	91	42.5	47	72.7	33	90.4	62	27.6	29	96.8	63	76.8	56	39.5	38
c.	26.2	245	14.3	14	27.0	37	0.0	17	21.4	14	33.4	21	41.7	12	41.0	39	20.0	5	29.7	37	46.2	39	30.0	10
d.	97.9	593	96.6	29	100.0	69	100.0	48	97.9	96	100.0	55	97.3	37	95.2	62	100.0	32	86.9	61	100.0	60	95.5	44
e.	71.3	563	73.1	26	83.3	66	73.2	41	85.4	96	75.0	52	73.5	34	35.6	59	86.7	30	96.9	65	41.3	58	63.9	36
f.	95.7	577	96.5	28	100.0	66	100.0	46	99.0	98	100.0	56	94.4	36	96.8	64	86.7	30	61.3	49	93.4	61	90.7	43
g.	75.8	579	89.6	29	83.5	67	77.1	48	82.8	99	91.3	57	81.0	37	87.5	64	42.0	31	23.2	43	74.2	62	42.9	42
h.	98.0	585	100.0	28	98.5	69	93.8	48	100.0	99	98.2	57	100.0	38	100.0	64	96.9	32	88.9	45	100.0	62	97.7	43
i.	90.6	598	100.0	30	91.1	67	100.0	49	96.9	97	77.2	57	89.5	38	86.0	64	83.9	31	86.6	60	85.3	61	88.6	44
j.	52.2	487	73.3	30	60.7	56	21.9	32	68.7	99	67.4	43	40.5	37	57.8	64	37.9	29	23.1	13	29.3	58	61.5	26
k.	61.5	590	62.0	29	53.0	66	52.3	44	64.9	97	73.7	57	62.1	37	76.6	64	43.8	32	44.1	59	65.6	61	61.4	44
l.	86.3	591	82.7	29	92.6	68	91.7	48	89.7	97	85.7	56	94.4	36	83.9	62	67.7	31	93.8	64	81.7	60	70.0	40
m.	74.5	447	81.8	22	88.2	59	64.5	31	85.6	83	85.7	35	87.1	31	68.9	45	36.8	19	48.3	60	59.3	27	62.9	35

Facilities/Services
a. Desktop computer
b. Notebook computer (for use in school)
c. Notebook computer (for take-home use)
d. Internet
e. E-mail account provided by school
f. File server storage space
g. Digital camera/video camera
h. Printer (black-and-white)
i. Printer (colour)
j. Visualiser
k. CD Writer
l. Educational Software
m. Online teaching/learning platform
%=percentage of choosing options of 'always' or 'occasionally'; N= Total number of teachers

Table 9.3h: Availability and extent of use of IT facilities/services by therapists/specialists in schools (Therapists'/Specialists' Questionnaire, Q. 2a)

	Overall		**PH**		**MMH**		**ModMH**		**MmodMH**		**SMH**		**SD**		**HI**		**VI**		**H**		**PS**		**SOS**	
	%	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**
a.	98.0	57	100.0	15	87.5	8	100.0	5	100.0	9	100.0	19	-	-	100.0	1	-	-	-		-	-	-	-
b.	33.1	55	20.0	15	37.5	8	40.0	5	25.0	8	38.9	18	-	-	100.0	1	-	-	-	-	-	-	-	-
c.	4.5	12	0.0	4	25.0	4	0.0	2	-	-	0.0	2	-	-		-	-	-	-	-	-	-	-	-
d.	94.8	58	93.3	15	100.0	8	100.0	5	100.0	9	90.0	20	-	-	100.0	1	-	-	-	-	-	-	-	-
e.	59.8	50	40.0	15	62.5	8	60.0	5	77.8	9	66.7	12	-	-	100.0	1	-	-	-	-	-	-	-	-
f.	98.2	55	92.8	14	100.0	7	100.0	5	100.0	9	100.0	19	-	-	100.0	1	-	-	-	-	-	-	-	-
g.	83.0	57	93.3	15	62.5	8	60.0	5	87.5	8	90.0	20	-	-	100.0	1	-	-	-	-	-	-	-	-
h.	97.2	57	100.0	15	100.0	8	75.0	4	100.0	9	100.0	20	-	-	100.0	1	-	-	-	-	-	-	-	-
i.	85.1	56	100.0	14	62.5	8	100.0	4	100.0	9	75.0	20	-	-	100.0	1	-	-	-	-	-	-	-	-
j.	49.3	47	53.3	15	28.6	7	33.3	3	33.3	9	66.6	12	-	-	0.0	1	-	-	-	-	-	-	-	-
k.	43.0	56	28.6	14	12.5	8	60.0	5	33.3	9	63.2	19	-	-	100.0	1	-	-	-	-	-	-	-	-
l	40.2	56	26.7	15	50.0	8	40.0	5	75.0	8	36.8	19	-	-	0.0	1	-	-	-	-	-	-	-	-
m.	27.3	37	28.6	7	16.7	6	25.0	4	57.2	7	23.1	13	-	-	-	-	-	-	-	-	-	-	-	-

Facilities/Services
a. Desktop computer
b. Notebook computer (for use in school)
c. Notebook computer (for take-home use)
d. Internet
e. E-mail account provided by school
f. File server storage space
g. Digital camera/video camera
h. Printer (black-and-white)
i. Printer (colour)
j. Visualiser
k. CD Writer
l. Educational Software
m. Online teaching/learning platform
%=percentage of choosing options of 'always' or 'occasionally'; N= Total number of teachers

Table 9.3i: Heads' ratings of support needs in schools (School Heads' Questionnaire, Q. 18)

	Overall			**PH**			**MMH**			**ModMH**			**MmodMH**			**SMH**			**SD**			**HI**			**VI**			**H**			**PS**			**SOS**		
	M	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**
a.	3.0	0.8	66	3.0	0	6	3.1	0.7	10	3.0	1.3	13	3.0	0.7	5	3.2	0.7	9	3.0	0.6	7	3.0	0.8	4	3.0	0.0	2	3.0	-	1	3.5	0.7	2	2.9	0.4	7
b.	3.0	0.8	66	2.8	0.4	6	3.1	0.7	10	3.0	1.3	13	2.8	1.1	5	3.2	0.4	9	2.9	0.7	7	3.3	1.0	4	3.0	0.0	2	3.0	-	1	3.5	0.7	2	2.7	0.5	7
c.	2.7	0.9	66	2.5	1.0	6	3.0	0.8	10	2.8	0.9	13	2.4	0.9	5	2.2	1.2	9	2.7	1.0	7	3.5	1.0	4	2.5	0.7	2	2.0	-	1	2.5	0.7	2	3.0	0.6	7
d.	3.0	0.9	66	2.7	0.8	6	3.4	0.7	10	3.2	1.1	13	2.6	0.5	5	3.1	0.8	9	2.7	0.8	7	3.3	1.0	4	3.0	1.4	2	3.0	-	1	2.5	0.7	2	2.7	0.8	7
e.	2.6	0.9	66	2.2	0.8	6	3.0	0.7	10	2.8	1.0	13	2.6	0.5	5	2.6	0.9	9	2.4	1.1	7	3.0	0.8	4	3.0	1.4	2	2.0	-	1	2.0	1.4	2	2.1	0.7	7
f.	1.7	1.1	66	1.8	0.8	6	2.3	1.1	10	1.5	1.1	13	1.6	0.9	5	0.9	1.3	9	1.6	1.1	7	2.8	0.5	4	1.5	0.7	2	2.0	-	1	1.0	1.4	2	2.0	1.0	7
g.	3.2	0.8	66	3.2	0.4	6	3.4	0.7	10	3.4	0.8	13	3.4	0.5	5	3.7	0.5	9	2.3	1.1	7	2.8	0.5	4	3.5	0.7	2	3.0	-	1	2.5	2.1	2	2.9	0.7	7
h.	3.2	0.9	66	3.3	0.8	6	3.8	0.4	10	3.4	0.7	13	3.4	0.5	5	2.9	1.1	9	2.6	1.1	7	3.3	0.5	4	3.5	0.7	2	3.0	-	1	3.5	0.7	2	2.1	1.2	7
i.	3.2	0.8	66	3.5	0.5	6	3.8	0.4	10	3.3	0.6	13	3.4	0.5	5	3.0	1.0	9	2.6	1.1	7	3.3	0.5	4	3.5	0.7	2	3.0	-	1	3.5	0.7	2	2.4	1.1	7
j.	2.8	1.1	66	3.2	0.8	6	3.2	1.2	10	2.9	1.1	13	2.8	1.3	5	2.7	1.1	9	2.4	1.4	7	2.8	0.5	4	3.0	1.4	2	3.0	-	1	1.5	0.7	2	2.6	1.1	7
k.	3.4	0.7	66	3.3	0.8	6	3.6	0.5	10	3.6	0.5	13	3.0	0.0	5	3.4	0.7	9	3.1	0.7	7	3.5	0.6	4	4.0	0.0	2	3.0	-	1	3.0	1.4	2	3.0	1.0	7
l.	3.1	0.7	66	3.7	0.5	6	3.3	0.7	10	3.1	0.8	13	2.8	0.8	5	3.1	0.3	9	2.9	1.1	7	3.0	0.8	4	3.5	0.7	2	3.0	-	1	3.0	0.0	2	2.9	0.7	7
m.	2.8	1.0	65	3.7	0.5	6	3.2	0.6	10	2.9	0.8	13	3.0	0.7	5	3.0	0.5	8	1.4	1.1	7	2.8	1.3	4	4.0	0.0	2	2.0	-	1	2.0	0.0	2	2.0	1.2	7

Needs
a. Integrating IT into the school curriculum
b. Using IT in teaching/assisting teaching
c. Enhancing the IT skills of students
d. Enhancing the IT skills of teachers
e. Sharing experiences with teachers from other schools
f. Sharing experiences with students from other schools
g. Using IT for performing/supporting school administration/management tasks
h. Increasing the number of/upgrading computers
i. Increasing the amount of/upgrading computer peripherals
j. Increasing the number of network nodes in school
k. Increasing the amount of/upgrading educational software and IT teaching resources
l. Using IT to support students with learning difficulties
m. Using IT to provide therapy or training

Table 9.3j: IT team members' ratings of support needs in schools (IT team members' Questionnaire, Q. 5)

	Overall			**PH**			**MMH**			**ModMH**			**MmodMH**			**SMH**			**SD**			**HI**			**VI**			**H**			**PS**			**SOS**		
	M	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**
a.	2.9	0.09	102	3.0	0.00	7	2.5	0.26	12	3.0	0.00	12	3.3	0.21	15	2.7	0.14	11	2.9	0.27	8	2.4	0.14	7	3.3	0.00	4	3.0	0.00	7	3.3	0.05	11	2.5	0.63	8
b.	2.9	0.10	102	3.0	0.24	7	2.3	0.38	12	3.1	0.06	12	3.1	0.29	15	3.0	0.23	11	2.9	0.27	8	2.7	0.17	7	3.3	0.00	4	3.4	0.00	7	3.0	0.00	11	2.3	0.42	8
c.	2.8	0.10	101	3.1	0.07	7	2.3	0.38	12	3.1	0.08	11	2.9	0.37	15	1.9	0.27	11	3.0	0.16	8	2.7	0.03	7	3.3	0.00	4	3.0	0.00	7	3.2	0.01	11	2.8	0.42	8
d.	3.0	0.07	102	2.6	0.21	7	2.6	0.20	12	3.3	0.10	12	3.3	0.23	15	2.8	0.18	11	3.0	0.16	8	2.9	0.12	7	3.3	0.00	4	3.4	0.00	7	3.1	0.07	11	2.8	0.21	8
e.	2.5	0.08	102	2.6	0.03	7	2.3	0.18	12	2.6	0.32	12	2.9	0.23	15	2.7	0.04	11	1.9	0.11	8	2.3	0.17	7	3.0	0.00	4	2.9	0.00	7	2.5	0.22	11	2.0	0.00	8
f.	2.0	0.07	102	1.6	0.03	7	1.8	0.23	12	1.9	0.16	12	2.6	0.22	15	1.4	0.25	11	1.8	0.22	8	2.0	0.40	7	2.8	0.00	4	2.3	0.00	7	2.5	0.04	11	1.9	0.11	8
g.	2.9	0.11	102	2.3	0.34	7	2.2	0.39	12	3.1	0.29	12	3.3	0.06	15	3.3	0.34	11	2.6	0.35	8	2.4	0.26	7	3.5	0.00	4	3.3	0.00	7	2.9	0.19	11	2.6	0.11	8
h.	3.1	0.11	102	2.3	0.10	7	3.4	0.24	12	3.1	0.29	12	3.1	0.29	15	3.1	0.27	11	3.0	0.33	8	2.7	0.17	7	3.8	0.00	4	3.4	0.00	7	3.5	0.04	11	2.6	0.53	8
i.	3.1	0.08	102	2.9	0.07	7	3.3	0.21	12	3.2	0.25	12	3.5	0.14	15	3.3	0.32	11	3.0	0.33	8	2.7	0.17	7	3.8	0.00	4	3.7	0.00	7	3.3	0.21	11	2.5	0.21	8
j.	3.0	0.09	101	2.3	0.19	6	3.0	0.24	12	3.2	0.25	12	2.9	0.23	15	3.1	0.27	11	3.0	0.33	8	2.3	0.03	7	3.3	0.00	4	3.4	0.00	7	3.2	0.27	11	2.9	0.32	8
k.	3.4	0.05	102	3.3	0.10	7	3.3	0.18	12	3.4	0.09	12	3.5	0.07	15	3.3	0.14	11	3.4	0.21	8	3.1	0.32	7	3.5	0.00	4	3.6	0.00	7	3.4	0.11	11	3.3	0.21	8
l.	2.9	0.09	101	3.4	0.03	7	2.6	0.22	12	2.9	0.35	11	3.2	0.22	15	2.4	0.28	11	2.9	0.11	8	3.0	0.20	7	3.5	0.00	4	3.6	0.00	7	2.7	0.05	11	3.0	0.21	8

Needs

a. Integrating IT into the school curriculum
b. Using IT in teaching/assisting teaching
c. Enhancing the IT skills of students
d. Enhancing the IT skills of teachers
e. Sharing experiences with teachers from other schools
f. Sharing experiences with students from other schools
g. Using IT for performing/supporting school administration/management tasks
h. Increasing the number of/upgrading computers
i. Increasing the amount of/upgrading computer peripherals
j. Increasing the number of network nodes in school
k. Increasing the amount of/upgrading educational software and IT teaching resources
l. Using IT to support students with learning difficulties

Table 9.3k: Obstacles to using IT in teaching encountered by teachers (Teachers' Questionnaire, Q. 6)

	Overall		PH		MMH		ModMH		MmodMH		SMH		SD		HI		VI		H		PS		SOS	
	%	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**
a.	81.0	617	79.3	29	72.9	70	84.0	50	77.8	99	83.1	59	80.5	41	73.9	65	86.7	30	82.1	67	88.7	62	88.9	45
b.	63.8	610	69.0	29	65.2	69	60.4	48	62.5	96	72.4	58	65.0	40	55.4	65	73.3	30	77.6	67	63.5	63	53.3	45
c.	32.6	596	35.7	28	35.3	68	25.0	48	21.5	93	45.6	57	37.8	37	32.8	64	48.2	27	50.0	66	31.8	63	24.4	45
d.	75.3	605	79.3	29	79.1	67	75.0	48	65.0	97	81.0	58	76.3	38	65.6	64	78.6	28	73.1	67	71.9	64	84.4	45
e.	55.2	601	69.0	29	52.9	68	40.4	47	44.2	95	65.5	58	66.7	36	56.9	65	75.0	28	56.1	66	51.6	64	62.2	45
f.	51.0	602	55.6	27	38.8	67	51.1	47	33.7	95	61.4	57	55.0	40	50.0	66	78.6	28	62.7	67	54.7	64	61.4	44
g.	39.5	598	52.0	25	29.4	68	44.7	47	24.0	96	41.8	55	46.2	39	35.4	65	50.0	28	50.0	66	48.4	64	42.2	45
h.	47.5	587	46.2	26	40.3	67	54.4	46	34.4	93	50.0	56	44.4	36	46.9	64	57.7	26	50.0	66	56.5	62	55.6	45
i.	50.2	602	57.1	28	55.1	69	48.9	47	33.0	94	50.0	58	54.1	37	52.3	65	34.5	29	59.7	67	56.3	64	54.6	44
j.	52.9	601	66.7	27	55.7	70	55.1	49	29.5	95	41.1	56	69.2	39	46.2	65	24.1	29	62.9	62	56.3	64	75.6	45
k.	62.3	606	75.9	29	58.6	70	81.6	49	47.9	94	55.4	56	64.1	39	56.9	65	37.9	29	51.5	66	70.3	64	64.4	45
l.	31.2	599	22.2	27	30.0	70	27.7	47	17.7	96	16.4	55	50.0	38	27.7	65	21.4	28	78.5	65	48.4	64	40.9	44
m.	58.7	602	79.3	29	48.6	70	71.4	49	52.6	95	64.3	56	44.7	38	33.9	65	59.3	27	71.9	64	79.7	64	48.9	45
n.	51.6	605	57.1	28	58.6	70	42.6	47	49.0	96	46.4	56	47.4	38	61.5	65	27.6	29	47.8	67	56.3	64	57.8	45
o.	72.2	603	79.3	29	73.1	67	72.3	47	56.7	97	75.0	56	73.0	37	72.1	66	89.3	28	68.7	67	79.7	64	75.6	45
p.	67.0	600	82.8	29	65.2	66	63.8	47	51.6	97	86.0	57	62.2	37	59.1	66	81.5	27	70.8	65	67.2	64	66.7	45

Difficulties
a. Your workload is so heavy that you do not have time to adopt IT in teaching
b. Lack of knowledge/skills in applying IT in teaching
c. Lack of interest in using IT
d. As you need time to prepare for the IT-related materials or participate in training and professional development, your teaching quality is affected
e. The teacher training/professional development courses currently available do not match your needs for IT in education
f. The existing curriculum is not conducive to IT applications inside the classroom
g. The school does not have a clear objective in adopting IT in teaching and learning
h. The school does not have any effective and practical scheme (e.g. reward scheme) to encourage teachers to adopt IT in teaching and learning
i. Insufficient technical support in school
j. Insufficient computer rooms
k. Insufficient computers
l. Insufficient bandwidth for access to the Internet
m. Insufficient IT facilities in classrooms (e.g., screens and projectors)
n. Insufficient IT peripherals (e.g. printers)
o. Lack of suitable educational software/IT resources
p. Lack of suitable assistive device to help students in using IT
% = percentage choosing option of 'Yes'; N=Total number of teachers

Table 9.3*l*: Obstacles to using IT in therapy/training encountered by teachers (Therapists'/Specialists' Questionnaire, Q. 6)

	Overall		**PH**		**MMH**		**ModMH**		**MmodMH**		**SMH**		**SD**		**HI**		**VI**		**H**		**PS**		**SOS**	
	%	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**
a.	87.5	55	84.6	13	71.4	7	100.0	5	88.9	9	95.0	20	-	0	0.0	1	-	0	-	0	-	0	-	0
b.	75.8	55	92.3	13	57.1	7	60.0	5	55.6	9	85.0	20	-	0	0.0	1	-	0	-	0	-	0	-	0
c.	20.7	55	15.4	13	42.9	7	40.0	5	0.0	9	15.0	20	-	0	0.0	1	-	0	-	0	-	0	-	0
d.	76.4	56	71.4	14	85.7	7	100.0	5	77.8	9	70.0	20	-	0	0.0	1	-	0	-	0	-	0	-	0
e.	85.7	52	83.3	12	100.0	6	100.0	4	88.9	9	75.0	20	-	0	100.0	1	-	0	-	0	-	0	-	0
f.	67.3	55	53.9	13	71.4	7	100.0	5	55.6	9	70.0	20	-	0	0.0	1	-	0	-	0	-	0	-	0
g.	48.8	54	61.5	13	14.3	7	50.0	4	0.0	9	70.0	20	-	0	0.0	1	-	0	-	0	-	0	-	0
h.	55.8	53	53.9	13	50.0	6	50.0	4	22.2	9	70.0	20	-	0	100.0	1	-	0	-	0	-	0	-	0
i.	46.3	54	50.0	12	14.3	7	40.0	5	33.3	9	65.0	20	-	0	0.0	1	-	0	-	0	-	0	-	0
j.	44.4	54	33.3	12	42.9	7	60.0	5	33.3	9	50.0	20	-	0	100.0	1	-	0	-	0	-	0	-	0
k.	70.5	55	84.6	13	57.1	7	80.0	5	44.4	9	70.0	20	-	0	100.0	1	-	0	-	0	-	0	-	0
l.	20.3	54	16.7	12	0.0	7	40.0	5	33.3	9	20.0	20	-	0	100.0	1	-	0	-	0	-	0	-	0
m.	42.9	54	25.0	12	28.6	7	80.0	5	22.2	9	55.0	20	-	0	100.0	1	-	0	-	0	-	0	-	0
n.	58.7	54	58.3	12	28.6	7	60.0	5	44.4	9	75.0	20	-	0	100.0	1	-	0	-	0	-	0	-	0
o.	75.3	54	69.2	13	50.0	6	80.0	5	88.9	9	85.0	20	-	0	100.0	1	-	0	-	0	-	0	-	0
p.	76.1	54	76.9	13	50.0	6	80.0	5	77.8	9	85.0	20	-	0	100.0	1	-	0	-	0	-	0	-	0

Difficulties
a. Your workload is so heavy that you do not have time to adopt IT in therapy/training
b. Lack of knowledge/skills in applying IT in therapy/training
c. Lack of interest in using IT
d. As you need time to prepare for the IT-related materials or participate in therapy/training and professional development, your therapy/training quality is affected
e. The teacher training/professional development courses currently available do not match your needs for IT in education
f. The existing therapy/training is not conducive to IT applications inside the classroom
g. The school does not have a clear objective in adopting IT in therapy/training
h. The school does not have any effective and practical scheme (e.g. reward scheme) to encourage therapists/specialists to adopt IT in therapy/training
i. Insufficient technical support in school
j. Insufficient computer rooms
k. Insufficient computers
l. Insufficient bandwidth for access to the Internet
m. Insufficient IT facilities in classrooms (e.g., screens and projectors)
n. Insufficient IT peripherals (e.g. printers)
o. Lack of suitable educational software/IT resources
p. Lack of suitable assistive device to help students in using IT
% = percentage choosing option of 'Yes'; N=Total number of therapists/specialists

9.4 School and wider community culture

This section considers various aspects of the school culture and that of the wider community. The first of these is the beliefs and visions of the school leaders and IT leaders within the school and the ways in which they are reflected in the school's IT plan. Factors taken into account in implementing IT in the school and the actual roles of the school's leaders can also have an impact upon the school's IT culture, hence these factors are examined along with the interactions between schools and wider community groups in establishing the IT culture. Following this is a description of the activities that schools have organised to promote an IT culture within the school and the wider community and the final sections examine the extent and nature of the impact of IT on the school and community cultures and factors that can affect them.

When students were asked about the kinds of assistance they want when using IT for learning (Students' Questionnaire item 29) the most frequently indicated was computer technical support from school after school hours (44.6%) followed by extension of opening hours of school computer facilities after school (40%) then provision of computers to students for home usage (37.5%). 32.1% said they would like enhancement of the computer facilities at public libraries/community centres/youth centres and 32.3% that they would like extensions of the opening hours of these facilities.

9.4.1 School leaders' beliefs and visions

It is an encouraging sign of the emerging IT culture in special schools that 87.5% of the school heads admit that their schools have developed a school IT plan in education (School Heads' Questionnaire item 13c). The most common goals for IT plans (Table 9.37, School Heads' Questionnaire item 5) are concerned with making the learning process more interesting (96.9% rating this item as quite or very important), improving students' learning outcomes (94%), providing suitable learning activities to cater for individual needs (89.5%) and strengthening students' initiative, independence and sense of responsibility in learning (72.8%). Around 60% of the respondents indicated as quite/very important the goals of improving communication and cooperation within their schools, parents and the community (62.1%), improving collaboration between different subjects and integrating the curriculum (62.1%) and providing training to prepare students for further study or future careers (59.1%). Relatively lower proportions think that using IT can strengthen/develop students' analytical power/creativity (56.9%) and cooperation among students (43.1%) or satisfy the expectations of parents and the community (51.5%). Compared to the Preliminary Study there has been quite a decrease in the percentages of school heads rating these items as quite or very important. In the Preliminary Study from 70% to 100% of school heads rated all items as quite or very important. The only items where there seems to be some consistency are improving students' learning outcomes (94% rating as quite or very important in this Study compared to 93.3% in the Preliminary Study) and making the learning process more interesting (96.9% and 100% respectively).

Table 9.37: Heads' perceptions of importance of goals in formulating School IT plan (School Heads' Questionnaire, Q. 5)

Goals	Mean (0-4)	SD	N	% of heads choosing the option				
				Very important	Quite important	Average	Not very important	Not important at all
a.	3.4	0.7	66	48.5	45.5	4.6	1.5	0
b.	3.5	0.6	66	53.0	43.9	3.0	0.0	0
c.	3.1	0.8	66	34.9	37.9	25.8	1.5	0
d.	2.6	0.8	65	12.3	44.6	38.5	4.6	0
e.	2.4	0.9	65	10.8	32.3	40.0	16.9	0
f.	3.4	0.7	66	54.6	34.9	9.1	1.5	0
g.	2.5	1.2	66	22.7	36.4	18.2	16.7	6.1
h.	2.8	0.9	66	21.2	40.9	30.3	7.6	0
i.	2.6	0.8	66	12.1	50.0	27.3	10.6	0
j.	2.5	0.8	66	9.1	42.4	36.4	12.1	0

a. To improve students' learning outcomes
b. To make the learning process more interesting
c. To strengthen students' initiative, independence and sense of responsibility in learning
d. To strengthen/develop students' analytical power/creativity`
e. To strengthen/develop co-operation among students
f. To provide suitable learning activities according to individual needs
g. To provide training to prepare students for further study or future careers
h. To improve collaboration between different subjects and integrate the curriculum
i. To improve communication and co-operation among your school, parents and the community
j. To satisfy the expectations of parents and the community

Table 9.4a (appended at the end of this section) shows very few distinct patterns of school heads of different schools types reporting views that differed significantly from the overall means. The VI school heads gave higher mean ratings for five items: strengthening/developing co-operation among students (3.0 on a scale from 0 to 4 where 4 represents 'very important'), providing training to prepare students for further study or future careers (3.5), improving collaboration between different subjects and integrating the curriculum (3.5), improving communication and co-operation among school, parents and the community (3.5) and satisfying the expectations of parents and the community (3.0). The other cases of particularly high mean ratings were: PH schools, providing training to prepare students for further study or future careers (3.2); MMH schools, strengthening students' initiative, independence and sense of responsibility in learning (3.7); MmodMH schools, providing suitable learning activities according to individual needs (4.0) and satisfying the expectations of parents and the community (3.0); and PS schools, making the learning process more interesting (4.0). The SMH school heads gave particularly low means for five items: strengthening students' initiative, independence and sense of responsibility in learning (2.3), strengthening/developing students' analytical power/creativity (2.0), strengthening/developing co-operation among students (1.7), providing training to prepare students for future study or future careers (1.3) and improving collaboration between different subjects and integrating the curriculum (2.3). The PS school heads gave low means for four items: improving collaboration between different subjects and integrating the curriculum (2.0), improving communication and co-operation among school, parents and the community (1.5), providing suitable learning activities for individual needs (2.5) and satisfying the expectations of parents and the community (1.5). There was one low rating by the SOS heads, for providing suitable learning activities according to individual needs (2.9).

9.4.2 Implementation of the school IT plan

98.5% of the respondents indicated (School Heads' Questionnaire item 16) that they have adopted measures in the school IT plan for encouraging teachers to enroll for courses or participate in training in ITEd, while 95.5% have introduced strengthening security measures for school networks and 95.5% have policies regarding respecting intellectual property rights. Comparatively fewer said they have adopted the measures of defining IT learning targets (84.9%), preventing students from using or being exposed to unhealthy information (77.3%) and allowing students to use school computers appropriately for non-study purposes (62.1%). The least frequently described use is allowing public access to the IT facilities in schools (18.2%)

9.4.3 Leadership roles

The average number of IT team members per school is 4-5 members (School Heads' Questionnaire item 13a). The numbers of IT team members in schools range from 1-18. Half of the responding schools indicated they have one particular teacher who is responsible for overseeing all the ITEd-related activities while the other half of the schools have no particular teacher for that purpose (School Heads' Questionnaire item 13b). 56.1% of the respondents indicated that they have a group of teachers responsible for the IT-related areas while the remaining schools have no such arrangement. None of the respondents said that they have appointed any outside organization to oversee the ITEd-related activities. The most usual persons participating in formulating the IT plan are the IT Team (in 96.4% of the responding schools), the principal (in 80.4% of cases) and the school-administrators (in 50% of the schools). Other teachers (in 35.7% of the schools) and therapists (in 17.9% of the schools) are less frequently involved in this and the data indicate that students, parents, alumni association members or community members are never invited to participate (School Heads' Questionnaire item 13d).

All of the heads agreed or strongly agreed that their roles in ITEd (School Heads' Questionnaire item 8a) are encouraging/motivating teachers to make appropriate use of IT in teaching, setting clear objectives and guidelines for the school, providing sufficient training, professional development or support to teachers and allocating IT resources appropriately. Over 83% of them agreed or strongly agreed with their roles in integrating IT into school-based curriculum (98.5%) and promoting online learning (83.1%). Around 60% of the respondents agreed or strongly agreed that their roles are to make the school an exemplary model of IT use in teaching and learning (63.6%) and promote online communication among their schools, students, and parents (62.1%). Slightly lower percentages of the respondents agreed or strongly agreed that their roles are sharing/consolidating experiences in IT education with other schools/regions/countries (60.1%). Over 96% of the IT Team respondents agreed or strongly agreed that their functions and roles (IT Team Members' Questionnaire item 3) are to make recommendations to the school on the use of IT resources (99%), to encourage/motivate teachers to make appropriate use of IT in teaching (98.6%), to provide technical support for teachers in using ITEd (98.2%), to organize training/professional development for teachers (97.9%), and to coordinate all matters related to ITEd in school (96.2%). They also showed agreement or strong agreement that their roles are to formulate an ITEd plan in the school (91.1%) and to set clear objectives and guidelines for the school (92.4%). Relatively lower percentages of the respondents agreed or strongly agreed they have taken up the roles of making the school an exemplary model for making use of IT in teaching and learning (69.1%) and sharing/consolidating experiences in ITEd with other schools/regions/countries (65.1%). Interestingly, there is a strong claim from both the heads and the IT team members that they place much emphasis on encouraging and supporting the teachers to make use of IT in teaching and learning. In the interviews with school heads it was found that school heads encourage and support their teachers to use IT through experience sharing and practising to establish an IT culture in schools.

9.4.4 Activities to promote IT culture

97% of the surveyed special schools indicated that they had done at least one of the listed activities (School IT Survey item 4b) to promote IT culture during the two years prior to data collection. Of these, 80.3% had organized extra curricular activities for students, 72.7% had organised IT courses for parents and 40.9% had organised IT competitions. Much lower percentages were reported of schools organising courses for the general public, IT exhibitions and other activities.

Table 9.38: Frequency of engagement in activities to promote IT culture in the past year reported by school heads (School Heads' Questionnaire, Q. 9)

Activities	% of heads choosing the option				N
	Always	Occasionally	Rarely	Never	
Encouraged students to make use of IT in their daily lives	51.5	42.4	4.6	1.5	66
Provided IT courses to parents	16.7	60.6	12.1	10.6	66
Provided IT courses to the community	1.5	13.6	27.3	57.6	66
Made school IT facilities accessible to parents/public	10.6	27.3	21.2	40.9	66
Provided IT support to parents/the community	13.6	33.3	28.8	24.2	66
Co-operated with other schools through computer networks	6.1	21.2	34.9	37.9	66
Held public exhibitions or competitions on IT/IT in Education	1.5	10.8	18.5	69.2	65
Participated in public exhibitions or competitions on IT/IT in Education	0.0	21.5	23.1	55.4	65
Held experience sharing meetings for school staff	37.9	51.5	9.1	1.5	66
Held/participated in experience sharing meetings with other schools	10.9	67.2	14.1	7.8	64

When asked to rate the activities in which the school had engaged in the year prior to data collection (Table 9.38, School Heads' Questionnaire item 9), nearly all of the school heads claimed that they encourage students to make use of IT in their daily lives (93.9% saying they do this occasionally or always) and hold experience-sharing meetings for school staff (89.4% making this claim). Around 80% indicated that they occasionally/always hold or participate in experience sharing meetings with other schools (78.1%) and provide IT courses to parents (77.3%). Apart from these, about half of the respondents indicated that they have occasionally or always provided IT support to parents or the community. Only about one-third indicated that their schools have made IT facilities accessible to parents/public. Less than one-third reflected that their schools cooperated with other schools through computer networks (27.3%), participated in (21.5%) or held (12.3%) public exhibitions or competitions on ITEd or provided IT courses to the community (15.1%). When compared to the Preliminary Study results, some sharp increases can be seen. From 71.4% to 89.4% said they had provided IT courses to parents. An increase form 14.3% to 42.4% had provided IT courses to the community and an increase from 21.4% to 75.8% had provided IT support to parents/the community. From 21.4% in the Preliminary Study who reported having co-operated with other schools through computer networks, the figure has increased to 62.1% and 30.8% have held public exhibitions of competitions on IT/IT in education compared to 21.4% in the Preliminary Study.

From Table 9.4b (appended at the end of this section) it can be seen that the two VI school heads gave mean ratings that were higher than the norm for six of the given indicators of IT culture in their schools (1.5 to 3.0on a scale from 1 to 4 where 4 represents 'always' and 3 represents 'occasionally'), with the exception of encouraging students to make use of IT in their daily lives, providing IT courses to the community, making school facilities accessible to parents/public and holding experience sharing meetings for school staff. The SMH school heads had higher mean ratings on four items that were all concerned with establishing a sharing culture outside the school: providing IT course to parents (1.9), making school activities accessible to parents/public (1.8), providing IT support for parents and the community (2.0) and participating in experience sharing meetings with other schools (2.3). The MmodMH and HI heads both gave higher ratings for providing IT courses to parents (2.2 and 1.8 respectively). The MmodMH heads rated 2.8 for holding experience sharing meetings with staff and the HI for encouraging students to use IT in their daily lives (3.0) and providing IT courses to the community (1.3). The SOS school heads gave lower than average mean ratings for their provision of support to parents/the community (0.9) and holding/participating in experience sharing meetings with other schools (1.2).

9.4.5 Contributing parties to community-wide IT culture

It appears that the surveyed special school heads are of the opinion that it is the education-related institutions followed by the commercial organisations that enables the community to get in touch with

IT (School Heads' Questionnaire item 11). 89% of the school heads think that the EMB is making a considerable or great contribution to promoting a community-wide culture using IT, followed by local schools (81.3% rating this as having made a considerable or great contribution), then application system developers (71.9%) and Internet service providers (73.4%). In other words, the highest ratings were given to those who provide the services and resources. After this, 65.6% acknowledged the contribution of tertiary institutions, but only 53.2% thought that considerable/great contributions were being made by commerce and industry and less than half thought contributions were being made by professional education organizations (41.2%).

With regard to the parties from whom the school sought support to plan, install or deploy IT resources (School Heads' Questionnaire item 14 and IT Team Members' Questionnaire item 1), the most common, reported to be used by more than 94% of respondents, were IT team members and school administrators. 89.5% of school heads and 85.7% of IT team members reported consulting other teachers. 96.6% of the school heads and 94.4% of IT team members rated the input of the IT team members as being quite or very useful and 89.1% of school heads/74.3% of IT Team members rated the input of school administrators such as the vice-principal as quite or very useful. The input of other teachers was rated quite or very useful by 77.6% of school heads/81% of IT team members who responded to this question. 21.6% of school heads/41.4% of IT team members reported having consulted staff from EMB or the former ED and 54.4%/54.6% reported having consulted board of school directors/school management committee members. 64.6% and 47.4% respectively had consulted therapists in the school. There were very few reported incidents of schools seeking input from either students (16% of school heads/19.9% of IT team members) or parents (27.8% of school heads/26.6% of IT team members) for IT planning.

To explore further the contribution of community resources, some of the student data presented in student individual interviews have shown that students go to the community centres for free computer use when the provision of computing facilities is not sufficient in schools or at home. The data from Students' questionnaire item 16 reflect that 11.1% of the students surveyed said they use computers outside school hours in community/youth centres. Libraries and cyber-cafés are more popular locations for special education students. 23.1% and 6.7% of them said they use computers for these two locations respectively. In the parent interviews, they reflected that sometimes their children go to youth centres to use the computing facilities but they claimed that computing resources and services are rather inadequate in the community.

9.4.6 Parent involvement

In the interviews with parents, many parents reflected that it would be better for schools to have their own websites in order to provide students with an online environment to learn and study (such as downloading course materials and communicating with teachers and classmates). The parents would like to encourage their children to use more IT in education. They said that they are willing to spend money to facilitate and accelerate helping their children to obtain more IT knowledge and skills. The parents think that current IT support is enough in schools but they hope to know more about the details in order to help their children understand more about IT concepts. They suggested the need for more special support, equipment or facilities (e.g., IT enrichment courses, educational software, teaching materials) in schools and the community for their children who did not yet reach the standard ability or who had financial difficulties. Other than making efforts to facilitate academic usage, some parents also tried to find some IT entertainment for their children during leisure. Parents do upgrade the computing facilities from time to time and attempt to satisfy their children's needs.

9.4.7 Impact on school administration and communication

When questioned about their perceptions of the impact of ITEd (School Heads' Questionnaire, item 8e) most of the school heads agreed that ITEd has had positive impact on school administration and management. 97% agreed or strongly agreed that one impact has been improvement in school administration and management. 90.9% agreed or strongly agreed that there has been improvement in internal communication within the school and communication with external bodies. 97% agreed or strongly agreed that there has been improvement in the management of student records. 96.9% agreed or strongly agreed that there has been improvement in the management of teacher records. 98.4% agreed or strongly agreed that there has been improvement in teaching/learning resources.

9.4.8 Factors affecting IT culture

School policy and planning

Nearly all of the school heads and IT team members indicated that they have taken into account a full range of factors when planning, installing and deploying IT resources: school financial situation, teaching effectiveness, environment, allocation of manpower, and students', teachers' and curriculum needs, EMB policy and information security issues (School Heads' Questionnaire item 15 and IT Team Members' Questionnaire item 2). More than 96% of the heads rated most of these as factors taken into account, the exceptions being school image which was rated by only 73%, partnership with vendors (68.3%) and therapists' needs (69.5%). The IT team members' patterns were the same as the school heads', again with more than 90% rating all items except school image which was rated by only 73.6%, partnership with vendors (77%) and therapists' needs (67.7%).

Parents' attitudes and beliefs

Parents' attitudes and beliefs were revealed in the parent interviews. Parents generally think that ITEd is a trend and is becoming increasingly popular throughout the world. They believe that it is important for students to know more about IT knowledge and skills to make progress in their lives. IT can help them explore more information about their surroundings and the outside world, expose them to a wider range of information and data, news and messages. They can be trained to develop a more diverse range of knowledge with the use of IT.

The parents also expressed the belief that the students can acquire knowledge for supporting their study and learning. They can use IT for doing their homework and project work. By playing games or online searching, they can have entertainment and learn some academic skills.

It is also generally held by parents that practising IT-related skills can help students to increase their ability to think more quickly and deeply, and to exercise their motor skills. Furthermore, the parents said they believe that with IT the students can be trained to be more communicative and expressive to others. This helps them improve relationships with others, too. Another important point expressed by the parents is that IT can help students in their futures by equipping them with sufficient practical knowledge and skills which are applicable to their future jobs.

The following example from one of the individual interviews with a parent illustrates the belief that IT can help students with disabilities to lead more normal lives:

> *"My son has experienced problems in coordinating his limbs. He relies very much on the computer to help him input data and words into the file, or to perform information searching on the Internet. Without the use of a computer, it is hard for him to communicate with others and to do homework."*

9.4.9 Findings from the qualitative data

The impact and outcome of ITEd can be demonstrated through students' IT usages both inside and outside schools. Students' home environment, including parental attitudes and support for students' IT uses, is an immediate reflection of the wider community culture of ITEd. From qualitative results obtained, the following outlines the scenarios of computer access and connectivity in the home environment. The home usage is supposed to provide another opportunity to transfer learning from school to the home environment, as well as further application into daily living and community integration. This kind of independence and community-integration is considered crucial to students with special learning needs. The observed pattern of using computers at home and barriers to their utilization will be described. Variation among some schools types will be highlighted in terms of disability types and deviations in using/not-using computers.

Students and their parents generally felt that IT facilities in community centres and libraries do not cater for special needs adequately. For example facilities with sound/auditory support for visually impaired students, or special input devices or touch screens for students with physical handicaps are lacking in the community.

From the parent interviews, it can be concluded that the majority of parents showed high dedication in helping their children to use computers. They generally held the perception that computer usage can provide alternative means, bypass their children's disabilities, facilitate their children's learning and benefit their children in the long run, for example through enabling social communications, information access, employment preparation, and exploration of the world. Some parents of PH children said that they have even searched for learning resources from overseas or asked their overseas friends to purchase software to cater for their children's special needs. Some parents also mentioned that they are prepared to increase their own IT knowledge so they can help their children. Some reported that they have attended training sessions with their children so they could learn IT knowledge and skills together. They said they hoped that, through increasing their children's exposure to IT usages, opportunities could be explored to obtain breakthroughs in their children's learning and life aspects. Parents generally believed that the use of IT can help to compensate for their children's disabilities and thus enhance their life skills, such as augmenting communication and learning skills. One example is that students with deafness can use e-mail to communicate rather than the telephone. The attention span of students with mild-moderate mental handicaps can be enhanced by computer courseware with attractive audio visual presentations. Moreover, a physically handicapped child who cannot hold a pen can "write" by composing Chinese characters using a computer. These perceptions were also shared by the students. For example, students of Hearing Impaired Schools reported that they welcome teachers using computers to teach as they are attracted by the visual presentation such as PowerPoint with pictures and animations. When asked whether they would be much interested in this kind of pedagogy, students expressed that it would arouse their interest in learning and make it easier for them to learn.

Parents tended to hold the same opinion as students, teachers and school heads that the use of IT can facilitate the children's understanding of what is happening in the outside world, to which they might not otherwise have such easy access because of their handicaps, and that this can help to enhance their self-esteem. Generally, parents are willing to spend more time and money to improve both their own and their children's IT literacy and usages, for example by purchasing updated computers and computer access devices. However, the parents' positive aspiration is not so well supported as they receive little training from schools and do not work collaboratively with their children's schools. In the individual interviews with the parents it was found that, despite the fact that they recognize the importance of IT for their children, many of them expressed concern about their inability to provide the appropriate support to meet their children's special needs for using computers at home. One parent with an autistic child made the following comment about this problem:

> *For example, there are not sufficient IT facilities in both school and community environment. Students can only use the computer facilities by taking turns at school. The community does not provide IT facilities to cater for the needs of autistic students. Over the past four years, the IT facilities at school are still not enough, the same as before. As I don't have much knowledge about IT, I will try to apply for some IT courses and purchase a computer since computers have already become a necessity in daily life.*

Some parents expected their children's schools to take a more active role to help them to acquire more knowledge and skills to help students' computer usage at home. They believed that computer activities can help their children to acquire and practice better study skills and life skills, e.g., motor functions, communication skills and socio-recreational pursuits, etc. Some parents mentioned they would like to use interactive software to communicate and to find out what the child is thinking about. Some mentioned that their child has never used the computer at home because she/he requires assistance from others to do so.

Some parents of students with physical handicaps mentioned that they would encourage their children to teach them what they have learned in school, so that the parents could know their children’s IT learning and outcomes. This would also serve as a bridge to communicate with their child’s school.

On the other hand, it was found from the teacher interviews that joint student-parent activities, such as seminars, are quite common in special schools to be used as a strategy to help to let parents know more about how IT is used in schools, e.g., in subject teaching and therapy. However, teachers reported that they seldom use IT (e.g., in the form of school websites, e-mails, downloading information etc.) to communicate and/or collaborate with parents at home.

About the family support and related constraints, one school head reflected on one of the obstacles in promoting IT Education to students’ home. Although it is very important for the development in IT Education, some poor families or families with lower socio-economic status cannot make IT support available to their students. They might have financial difficulty preventing them from purchasing computers or gaining access to the Internet. It is believed that the provision of community and school support is one of the efficient methods to solve the problem. However, it is not possible to have full availability in these areas. Moreover, the operation processes may lead to increasing administrative difficulties.

The school IT cultures

In the interviews the majority of special school students reported that their teachers did not teach them very much about IT skills but rather using the computers for communication and learning-related games as well as information presentation such as watching educational TV, reading digital books, browsing the Internet and making PowerPoint presentations. Students perceived teachers as active users of computers in class, while students are passive learners and receivers and they are not requested to perform higher-order thinking. Special school students generally agreed that PowerPoint presentation is a good way for them to acquire and understand knowledge and they also use PowerPoint to do their homework.

Obstacles to using computers at school

From the teachers’ point of view, as described in the focus group interviews, one of the main obstacles to using IT in their teaching is that it is quite difficult for them to source appropriate software and courseware or resources because of the unique needs of individual school types. They require so many and varied resources. Whereas in a regular school one piece of software can be applied for the whole school for several years, in special schools one piece of software is only applicable for a small number of students. The teachers have to customize special learning packages for individual students that might not be applicable to other students.

Obstacles were also mentioned by students in the interviews. Students with physical handicaps reported that they would like to use computers and to explore the potential benefits to them. However, they do not use computer facilities very much as they do not know how to use them. They would like to have more instruction and guidance from school to use computers appropriately, e.g., provide useful websites to support their learning. Students with mild mental handicaps also said that they have difficulties in browsing web information and would like teachers to show them how to do it properly. Moreover time limits and language barriers were also reported as barriers for students to use computers at school.

Table 9.4a: Heads' perceptions of importance of goals in formulating School IT plan (School Heads' Questionnaire, Q. 5)

	Overall			**PH**			**MMH**			**ModMH**			**MmodMH**			**SMH**			**SD**			**HI**			**VI**			**H**			**PS**			**SOS**		
	M	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**
a.	3.4	0.7	66	3.5	0.5	6	3.4	0.7	10	3.5	0.7	13	3.6	0.5	5	3.4	0.7	9	3.1	1.1	7	3.3	0.5	4	3.5	0.7	2	4.0	-	1	3.5	0.7	2	3.1	0.4	7
b.	3.5	0.6	66	3.3	0.5	6	3.8	0.4	10	3.5	0.7	13	3.6	0.5	5	3.3	0.5	9	3.4	0.8	7	3.5	0.6	4	3.5	0.7	2	4.0	-	1	4.0	0	2	3.3	0.5	7
c.	3.1	0.8	66	3.2	1.0	6	3.7	0.5	10	3.1	0.9	13	3.2	0.4	5	2.3	0.5	9	3.1	0.9	7	3.0	1.4	4	3.5	0.7	2	3.0	-	1	3.0	0	2	2.7	0.8	7
d.	2.6	0.8	65	2.8	0.4	5	3.0	0.8	10	2.3	0.8	13	2.6	0.5	5	2.0	0.7	9	3.0	0.8	7	3.0	0.8	4	2.5	0.7	2	3.0	-	1	3.0	0	2	2.9	0.7	7
e.	2.4	0.9	65	2.7	0.5	6	2.7	0.9	10	2.1	1.0	13	2.6	0.5	5	1.7	0.5	9	2.6	1.3	7	2.8	0.5	4	3.0	-	1	3.0	-	1	2.0	0	2	2.4	1.0	7
f.	3.4	0.7	66	3.8	0.4	6	3.5	0.5	10	3.4	0.8	13	4.0	0	5	3.6	0.5	9	3.0	1.0	7	3.8	0.5	4	3.5	0.7	2	4.0	-	1	2.5	0.7	2	2.9	0.9	7
g.	2.5	1.2	66	3.2	0.8	6	2.6	1.2	10	2.3	1.4	13	2.8	0.4	5	1.3	1.2	9	2.9	1.2	7	3.5	0.6	4	3.5	0.7	2	1.0	-	1	2.0	1.4	2	2.9	0.4	7
h.	2.8	0.9	66	2.8	0.8	6	2.8	0.9	10	2.9	1.0	13	3.2	0.8	5	2.3	1.0	9	2.9	1.2	7	2.8	0.5	4	3.5	0.7	2	3.0	-	1	2.0	0	2	2.4	0.5	7
i.	2.6	0.8	66	2.5	0.8	6	2.8	0.6	10	2.8	1.1	13	2.6	0.5	5	3.0	0.5	9	2.4	1.1	7	2.3	0.5	4	3.5	0.7	2	2.0	-	1	1.5	0.7	2	2.3	0.8	7
j.	2.5	0.8	66	2.5	0.5	6	2.5	1.0	10	2.5	0.9	13	3.0	0.7	5	2.9	0.6	9	2.4	1.1	7	2.3	0.5	4	3.0	0	2	1.0	-	1	1.5	0.7	2	2.1	0.7	7

Goals
a. To improve students' learning outcomes
b. To make the learning process more interesting
c. To strengthen students' initiative, independence and sense of responsibility in learning
d. To strengthen/develop students' analytical power/creativity`
e. To strengthen/develop co-operation among students
f. To provide suitable learning activities according to individual needs
g. To provide training to prepare students for further study or future careers
h. To improve collaboration between different subjects and integrate the curriculum
i. To improve communication and co-operation among your school, parents and the community
j. To satisfy the expectations of parents and the community

Table 9.4b: Frequency of engagement in activities to promote IT culture in the past year reported by school heads (School Heads' Questionnaire, Q. 9)

	Overall			PH			MMH			ModMH			MmodMH			SMH			SD			HI			VI			H			PS			SOS		
	M	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**
a.	2.4	0.7	66	2.3	0.8	6	2.7	0.5	10	2.3	0.5	13	2.8	0.4	5	2.0	1.0	9	2.3	0.8	7	3.0	0.0	4	2.0	0.0	2	2.0	-	1	2.5	0.7	2	2.7	0.5	7
b.	1.8	0.8	66	1.8	1.0	6	2.0	0.7	10	2.1	0.6	13	2.2	0.8	5	1.9	0.8	9	0.9	0.9	7	1.8	0.5	4	3.0	0.0	2	0.0	-	1	2.0	0.0	2	1.7	0.8	7
c.	0.6	0.8	66	0.2	0.4	6	0.8	0.9	10	0.5	0.8	13	0.4	0.5	5	0.6	1.0	9	0.3	0.5	7	1.3	0.5	4	1.0	1.4	2	0.0	-	1	1.0	1.4	2	0.7	0.8	7
d.	1.1	1.1	66	0.5	0.8	6	1.4	0.8	10	1.2	1.3	13	0.4	0.5	5	1.8	1.4	9	0.6	0.5	7	1.3	1.0	4	1.5	0.7	2	0.0	-	1	1.0	0.0	2	1.0	1.0	7
e.	1.4	1.0	66	1.2	1.0	6	1.4	0.8	10	1.8	1.0	13	1.6	1.1	5	2.0	1.1	9	0.6	0.5	7	0.8	0.5	4	2.0	1.4	2	0.0	-	1	1.5	0.7	2	0.9	0.9	7
f.	1.0	0.9	66	0.8	0.8	6	1.2	0.9	10	0.6	0.8	13	1.0	1.0	5	1.4	1.1	9	0.7	0.8	7	1.0	0.8	4	2.5	0.7	2	0.0	-	1	0.5	0.7	2	0.7	1.0	7
g.	0.5	0.8	65	0.7	0.8	6	0.7	0.8	10	0.4	0.8	13	0.4	0.5	5	0.6	1.0	9	0.1	0.4	7	0.0	0.0	4	1.5	0.7	2	-	-	0	0.0	0.0	2	0.3	0.8	7
h.	0.7	0.8	65	0.8	1.0	6	0.8	0.9	10	0.5	0.9	13	0.8	0.8	5	0.6	0.9	9	0.3	0.5	7	1.0	0.8	4	1.5	0.7	2	-	-	0	1.0	0.0	2	0.4	0.8	7
i.	2.3	0.7	66	2.5	0.5	6	2.2	0.6	10	2.5	0.7	13	2.8	0.4	5	2.3	0.7	9	2.0	0.6	7	2.3	0.5	4	2.5	0.7	2	2.0	-	1	1.0	0.0	2	1.9	0.9	7
j.	1.8	0.7	64	2.0	0.0	6	2.0	0.0	10	1.8	0.4	13	2.0	1.2	5	2.3	1.0	8	1.3	0.5	7	1.8	0.5	4	2.5	0.7	2	2.0	-	1	1.0	1.4	2	1.2	1.0	6

Activities

a. Encouraged students to make use of IT in their daily lives
b. Provided IT courses to parents
c. Provided IT courses to the community
d. Made school IT facilities accessible to parents/public
e. Provided IT support to parents/the community
f. Co-operated with other schools through computer networks
g. Held public exhibitions or competitions on IT/IT in Education
h. Participated in public exhibitions or competitions on IT/IT in Education
i. Held experience sharing meetings for school staff
j. Held/participated in experience sharing meetings with other schools

9.5 Student learning

This section begins with a general overview of the extent to which special school students like their teachers to use computers in class. This is followed by an examination of the ways in which students use computers generally, and specifically at home or at school, and the strategies used by their teachers to encourage them to make use of IT outside school hours. The next part considers students' self-perceptions of their competence and confidence to use different aspects of IT. This is followed by a description of the outcomes of the IT Literacy Assessment (ITLA). A brief section considers students' attitudes toward using IT as measured by their participation in a range of appropriate and inappropriate computer-related behaviours, and the final part explores school heads', teachers' students' and parents' perceptions of the impact of IT use on cognitive and affective aspects of the students' learning.

9.5.1 General attitudes towards teachers' use of IT for teaching

When the special school students were asked to indicate the extent to which they liked their teachers using computers in class (Students' Questionnaire item 9), 81.3% of the students indicated they liked their teachers to use it quite or very much. This observation was supported by the student focus group interview data, where the students reported that they would like their teachers to use IT more in their classes. However, they reported that their teachers nearly always used IT for presentation instead of allowing the students to have hands-on use.

9.5.2 Students' reported use of IT

Table 9.39: Nature of IT use reported by students (Students' Questionnaire, Q. 23)

Nature of use	Response from	Students % of students choosing the option				N
		Always	Occasionally	Rarely	Never	
Communicating with others	Student	27.4	23.2	10.4	39.0	224
	Teacher	2.5	1.1	9.4	87.0	64
Collaborating with others	Student	14.7	23.5	20.5	41.3	225
	Teacher	0.0	3.3	13.6	83.1	64
Self-learning	Student	20.4	28.0	19.2	32.4	227
	Teacher	24.7	29.6	14.0	31.7	79
Tackling practical problems in daily life	Student	16.8	23.0	18.6	41.5	222
	Teacher	0.0	8.3	8.3	83.4	63
Doing creative work	Student	22.2	22.9	21.4	33.5	224
	Teacher	4.7	33.6	16.2	45.5	79

Table 9.39 (Students' Questionnaire item 23) shows the students' self-reported responses and those made by teachers on behalf of some students regarding tasks the students had performed/accomplished using IT. 50.6% of the students and 3.6% of the teachers reporting for students said they had occasionally or always used IT for communicating with others. 48.4% of students and 54.3% of teachers reporting for students said the students had used IT for self-learning. 45.1% of the students and 38.3% of the teachers reporting for students said that they students had used it for doing creative work.

From Table 9.5a (appended at the end of this section) we can see some differences in students' reported use of IT. Higher than average percentages of students from MmodMH (60.6% reporting occasionally or always), SD (64%), HI (71.9%), H (82%) and PS (82.2%) schools reported using IT for communicating with others. Lower than average percentages said they used IT for this purpose occasionally or always from PH (24.9%), MMH (33.3%) and VI (11.1%). Higher percentages of HI (76%) and H (83.9%) students said they had occasionally or always used IT for collaborating with others and lower percentages of MMH (23.1%) said they had done this. For use of IT for self-learning, higher percentages of SD (61.1%), MmodMH (73%), HI (64.6%) and H (90.8%) students and lower percentages of MMH (35.7%), VI (22.2%), PS (31.2%) and SOS (31.7%) reported occasional or always. The MmodMH (52.6%) and SOS (49.2%) students had higher percentages than the norm rating occasionally or always using IT for tackling problems in everyday life, with lower percentages from PH (28.7%) and PS (23.6%) reporting this. More HI (67.5%) and SOS (65.4%) said that they used IT occasionally or always for doing creative work and lower percentages of PH (28.9%), H (33.7%) and PS (31.4%) reported this use. There were only two teachers who responded on behalf of PH students – one said the student had used computers occasionally/always for communicating with others and one each for self-learning and tackling problems in daily life, but neither reported any use of the remaining purposes. Lower than average percentages of MmodMH teachers reported their students as using computers for self-learning (24.1%), doing creative work (6.3%) and all other items received no rating by MmodMH teachers. On the other hand, the teachers responding on behalf of the SMH students indicated higher than average percentages on all items (18.2% to 86.2%).

When students were asked about their actual usage in school, the data suggest that there is very little opportunity for special school students to use computers in class, other than in specific computer lessons. When computer lessons were excluded (Students' Questionnaire item 8), 20.4% of the students said they do not have any chance to use computers in class at all. 39.6% reported that they used computers in class once a week or less and 40% reported that they had a chance to use it 2-3 times per week or almost daily. However, while these figures seem low, they show some slight improvement on the numbers reported in the Preliminary Study.

At school (Students' Questionnaire item 4), the majority of students use computers for searching for information on the Internet with 48.7% of the students saying they had done this. The second highest is learning computer skills (29.9%), then doing drilling exercises (28%). Other purposes that relatively fewer students said they had used computers for were using self-learning software (15.8%), doing project work (14.1%) and presentations (9.8%).

Students' reports of the purposes for which their teachers encourage them to use computers outside class (Students' Questionnaire item 12) indicate that learning new knowledge is a high priority (67.3% of students indicating this). 52.6% of the said that their teachers had encouraged them to use computers for homework and 48.4% that their teachers encouraged them use IT to do extra-curricular activities. Only 40.9% indicated that their teachers encourage them to use computers to communicate with friends or classmates outside class.

Over 66% of the respondents reported they had not used IT for submitting their homework. Only 33.2% of the students who responded to this question themselves and 5.5% of the teachers who responded for students reported the students having submitted assignments using floppy disk; 31.4%/1.1% using E-mail, 21.7%/1.3% using CD-ROM and 19.5%/1.2% using school intranet (Students' Questionnaire, item 11).

Students' Questionnaire item 24 attempted to get some insights into students' roles in the use of IT. Of the students who responded to this item by themselves, 59.6% had occasionally or always engaged in self-learning of new computer skills/knowledge, 40% had occasionally/always recommended useful websites/software/hardware to classmates/friends, 43.7% had engaged in teaching others and 44.5% in helping others. This was one of the items to which teachers were asked to respond on behalf of some students. 8.6% of these teachers reported that the students for whom they were responding had occasionally or always engaged in self-learning of new computer skills/knowledge, 2.4% that they had occasionally/always recommended useful websites/software/hardware to classmates/friends, 8.2% that they had engaged in teaching others and 9.6% that they had engaged in helping others.

9.5.3 Students' pedagogical use of IT

Table 9.40 shows the average time spent per week by students on various activities as reported in the IT Activity Daily Log.

Table 9.40: Average time spent per week on various activities as reported in the ITADL

Activity type	Students (N = 112)			
	Time spent (min)	Importance (1–5)	Performance (1–5)	Liking (1–5)
Classroom activity	125.5	3.7	3.5	4.1
School works activity	33.5	3.7	3.3	3.9
Self-learning/studying	16.4	3.6	3.5	3.8
Communication	12.5	3.3	3.4	3.3
Browsing Internet	65.7	3.6	4.0	4.0
Listening Music	29.4	3.2	3.7	3.7
Watching Movie	11.5	2.4	2.9	3.7
Entertainment games	102.1	4.0	4.2	4.4
Learning-related games	31.1	3.9	4.0	4.2

An examination of the special school students' IT Activity Daily Log summary statistics indicate that the activity on which students spent the most time during the week of recording activities was classroom activity (125.5 minutes) and the second was entertainment games (102.1 minutes). After this, the activity on which the third most amount of time spent was browsing the Internet (65.7 minutes). When we look at the total amount of time spent on learning-related activities, including classroom activity, school work, self-learning and learning-related games, we can see that there is very little difference between the average reported time spent on learning-related activities (206.5 minutes) and entertainment activities (143 minutes).

Table 9.5b (appended at the end of this section) shows the breakdown of time spent on activities across schools. It can be seen that the PS students spent higher than average time of a range of activities including classroom activity (423 minutes), school work activity (182.5 minutes), communication (61.5 minutes), browsing the Internet (115.5 minutes), listening to music (161 minutes) and entertainment games (466.5 minutes). The HI students also reported spending more time than average on several activities: school work (97.3 minutes), self learning (62.2 minutes), communication (103.5 minutes) and browsing the Internet (179.3 minutes). The MMH group also spent higher than average time on classroom activity (236.2 minutes) and four groups, ModMH, MmodMH, HI and SOS, less than average (56.8 to 86.1 minutes). The SOS students reported spending higher time on browsing the Internet (153.3 minutes) and lower than average was reported by PH (16.3 minutes), ModMH (21.8 minutes) and SD (20 minutes). The SD students reported higher use of IT for entertainment games (342 minutes) and the PH (5 minutes), MMH (31.9 minutes), MmodMH (55.6 minutes) and SOS (68.3 minutes) all reported lower use for this purpose.

When considering the actual tools the students reported using, a clear pattern emerges of PC games (118.2 minutes) and web browser (96.1 minutes). The next most frequently-used tool was presentation software (61.6 minutes) followed by audio/video software (47 minutes). With the communication tools, students reported they spent 30.5 minutes on ICQ and 25.6 minutes on E-mail. They spent 23.5 minutes on word processor but only 3.9 minutes using spreadsheet software.

The most common locations where students reported using IT are in their own homes (212.9 minutes), followed by school lessons (154.8 minutes) and in school but outside lessons (29.9 minutes). They also reported some use of computers in other people's homes (9.6 minutes).

The students rated themselves the highest with respect to performance on entertainment games (4.2 on a scale from 1 to 5 where 5 represents 'excellent'), followed by learning-related games (4.0) and browsing the Internet (4.0). When we look at the students' ratings for liking the activities the highest mean ratings were given to entertainment games (4.4 on a scale from 1 to 5 where 5 represents 'strongly like'), followed by learning-related games (4.2) and classroom activities (4.1). When we look at the students' ratings of importance we can see that they also think games are important: entertainment games (4.0 on a scale from 1 to 5 where 5 represents 'very important'), followed by learning-related games (3.9), classroom activity (3.7) and school work activities (3.7).

For tools, the highest mean ratings for performance were PC games (4.2), audio/video software (3.8) and presentation software (3.8). For liking PC games was again the highest (4.4), followed by web browser, presentation software and audio/video software (all 4.0). For importance, once again, PC games were rated as the most important (4.1), equally with presentation software (4.1) and then word processing (3.8).

9.5.4 Students' self-ratings of IT competence

The first area in which students were asked to self-rate was their personal confidence with using IT (Table 9.41 Students' Questionnaire, item 30). 55.9% indicated that they feel quite or very confident in using computers for their own purposes and 27.1% indicated average confidence. Only 17% of the students said they feel not quite confident or not confident at all. This adds further support to the observation that computer use has become a part of life even for special school students.

Table 9.5c (appended at the end of this sector) indicates that higher than average percentages of MMH (70.2%), VI (64.3%) and H (82.6%) students rated themselves as quiet confident or very confident with using IT, while lower than average percentages of PS (22.2%) and SOS (23.7%) students rated themselves as such. In the latter two school types the majority rated themselves as average (55.5% and 62.7% respectively).

Table 9.41: Students' self-rating of personal confidence with using IT (Students' Questionnaire, Q. 30)

Confident level	**Students (N = 241)**
	%
Very confident	21.7
Quite confident	34.2
Average	27.1
Not quite confident	8.0
Not confident at all	9.0
Total	100

When asked about their self-rating of proficiency in hardware use (Table 9.42, Students' Questionnaire, item 21), less than half of them indicated they are basically or highly proficient in using printers (40.7% of self-responding students and 6.3% of teachers responding on behalf of the students) and CDR/CD-RWs (40% of students and 6.3% of teachers responding for student). Fewer of them showed that they are basically or highly proficient in using digital cameras (26.6%/0%), digital video recorders (22%/0%) and scanners (26.2%/1.9%).

As explained in the Methodology (Chapter 4) there were selected questions which teachers were asked to answer on behalf of those children who could not answer for themselves. Students' Questionnaire item 21 was one such question, hence the results in Table 9.5d (appended at the end of this section) have been presented separately. The HI and H students had consistent patterns of reporting higher mean self-ratings on all items (1.8 to 3.3 on a scale from 0 to 4, where 4 represents 'highly proficient') and the PS students did the same on all items (1.8 to 2.7) except CD-R/CD-RW. The SD students reported themselves higher than the overall mean on three items, digital camera (1.9), digital video recorder (1.7) and scanner (1.8) and the SOS students on printer (2.5), digital camera (1.8), digital video recorder (1.6) and scanner (2.0). The MMH students reported themselves to be lower than the overall means on all items. There were 4 teachers who responded on behalf of PH students and these teachers gave their students mean ratings that were lower than the overall mean for all the listed aspects of operating hardware (0 to 0.3). The teachers of the ModMH reported their students to be higher than the overall mean for using printers (1.4) and CD-R/CD-RW (1.8). The teachers reporting on behalf of MmodMH and SMH students reported their students to be lower than the overall mean for using CD-R/CD-RW (0.3 and 0.5 respectively).

Table 9.42: Students' self-rating of proficiency in using/operating hardware (Students' Questionnaire, Q.21)

Perceived proficiency	Response from	Mean (0-4)	SE	N	% of students choosing the option				
					Highly proficient	Basically proficient	Know some	Not proficient	Know nothing at all
Printer	Student	2.0	0.11	235	21.8	18.9	24.7	6.8	27.7
	Teacher	0.8	0.07	66	0.0	6.3	19.0	27.6	47.1
CD-R/CD-RW	Student	2.0	0.08	234	22.5	17.5	24.0	9.2	26.8
	Teacher	1.1	0.03	66	1.5	4.8	28.5	14.7	50.5
Digital Camera	Student	1.4	0.10	233	15.1	11.5	15.8	9.6	48.0
	Teacher	0.3	0.04	66	0.0	0.0	6.7	17.8	75.5
Digital Video	Student	1.1	0.10	233	10.8	11.2	10.5	12.0	55.5
Recorder	Teacher	0.2	0.03	66	0.0	0.0	3.9	16.4	79.7
Scanner	Student	1.4	0.11	232	17.9	8.3	13.9	12.6	47.3
	Teacher	0.3	0.04	66	0.0	1.9	3.9	16.0	78.2

Students' Questionnaire item 20 was one of the items for which teachers were asked to respond on behalf of some of the students. The breakdown of responses by students and responses by teachers on behalf of students is shown in Table 9.43. It can be seen that 50.5% of the students reporting for themselves (and 1.6% of the teachers reporting on behalf of their students) indicated that they are basically or highly proficient in using IT to search and use information on the Internet. Comparatively, students are less proficient in using online communication tools (43% self-reporting basically or highly proficient but no teachers reporting proficiency in this on behalf of students), word processing (43.7% of self-reporting students and 7.5% of teachers reporting for students) and designing graphics/drawing (40.3% of students and 5.1% of teachers reporting for students). Only about one-third of the students show that they are basically or highly proficient in using presentation software (35.4%/0.4%), designing webpages/sites (30.9%/0%), using spreadsheets (25.5%/0%) and using multi-media software (28.5%/3.1%). However, comparing Student Questionnaire item 20 (Table 9.43) on this Study to Student Questionnaire item 8 of the Preliminary Study, we can see some slight increase in the mean ratings in this Study. Generally, therefore, it seems that students perceive themselves to more proficient in software use than those surveyed in the Preliminary Study.

Table 9.5e (appended at the end of this section) shows that the H and HI students gave higher than overall mean self-ratings for their proficiency with all items (ranging from 2.0 to 3.3 on a scale from 0 to 4, where 4 represents 'highly proficient'). The SD students rather themselves higher than the average on using spreadsheets (2.2), using online communication tools (2.6), designing webpages/sites (2.0), designing computer graphics/drawing (2.5) and using multi-media software (2.0); the SOS students on spreadsheets (2.1), presentation software (2.3) and online designing webpages/sites (2.3); and the PS students on using online communication tools (2.6). The MMH students gave lower than average self-ratings for all items (0.6 to 1.6). The PH students gave low mean self-ratings for designing web pages (0.9) and using multi-media software (0.7); the MmodMH students for using spreadsheets (0.7), presentation software (1.2), designing webpages/sites (1.0) and using multi-media software (0.4); and the VI students for presentation software (0.9), online communication tools (1.2), designing web pages (1.0), designing computer graphics/drawing (0.4) and using multi-media software (0.3). When we look at the mean ratings given by the teachers who responded on behalf of their students, we can see that the PH teachers gave their students mean ratings of 0 on five items: using presentation software, searching and using information on the Internet, designing webpages/sites, designing computer graphics/drawing, and using multi-media software, and a low rating (0.4) for using word processing software. The teachers reporting for the ModMH students gave them a higher rating than the overall mean for use of word processing software (1.4) and the teachers reporting for MmodMH and SMH students gave them a lower rating for the same item (0.3 and 0.4 respectively).

Table 9.43: Students' self-rating of proficiency in software use (Students' Questionnaire, Q.20)

Perceived proficiency	Response from	Mean	SE	N	% of students choosing the option				
					Highly proficient	Basically proficient	Know some	Not proficient	Know nothing at all
Using word processing software	Student	2.1	0.10	229	18.4	25.3	27.6	8.4	20.3
	Teacher	0.8	0.04	65	1.6	5.9	11.4	28.3	52.9
Using spreadsheets	Student	1.4	0.07	227	8.9	16.6	25.4	8.3	40.9
	Teacher	0.3	0.03	65	0.0	0.0	5.1	15.6	79.3
Using presentation software	Student	1.5	0.08	227	15.4	20.0	16.6	8.8	39.3
	Teacher	0.3	0.03	65	0.0	0.4	4.0	19.2	76.3
Using online communication tools	Student	1.9	0.10	226	25.1	17.9	14.8	9.6	32.7
	Teacher	0.2	0.03	65	0.0	0.0	3.7	15.0	81.3
Searching and using information on the Internet	Student	2.3	0.09	225	26.7	23.8	20.7	8.2	20.6
	Teacher	0.4	0.05	65	0.0	1.6	11.3	16.6	70.5
Designing webpages/sites	Student	1.5	0.10	223	15.6	15.3	15.3	10.7	43.2
	Teacher	0.2	0.03	65	0.0	0.0	2.7	15.0	82.4
Designing computer graphics/ drawing	Student	1.8	0.09	223	19.0	21.3	14.2	9.0	36.6
	Teacher	0.6	0.08	66	1.4	3.7	15.6	13.4	65.9
Using multi-media software	Student	1.3	0.10	222	9.6	18.9	15.1	6.7	49.7
	Teacher	0.3	0.04	65	0.0	3.1	4.9	14.1	77.9

9.5.5 IT literacy assessment outcomes

ITLA Section 1 (Computer knowledge and skills)

IT literacy of students of special schools was assessed using 4 stages of IT literacy development. They are stage 1: primary 1 to 3; stage 2: primary 4 to 6; stage 3: secondary 1 to 3; stage 4: secondary 4 to 5. As explained in Chapter 4, in order to examine the extent to which the students had met the criterion-based expectations of IT targets on the ITLA Section 1, three categories of indicator were used: those who were able to answer less than 50% of the items correctly, those who were able to answer from 50% to 80% of the items correctly and those who were able to answer more than 80% correctly. Students who scored above 80% were considered to have complete mastery of the stage-specific knowledge and skills, since a 20% tolerance level was set up to allow for random variation which may affect the test score from a variety of sources, such as distractions in the assessment environment, the occasion of testing, the rater, the examinee's state of mind at the time of testing, etc. It is not intended to be a cut-off point implying pass/fail or competence/incompetence since students' competence should be conceived of as a continuum of skills rather than a dichotomy, and any chosen tolerance level is arbitrary. Those who scored from 50% to 80% were considered to have at least a reasonable grasp.

In Section 1 of the ITLA (Table 9.44) only 3.2% of stage 1 students, 18.4% of stage 2, 1.9% of stage 3 and 9.4% of stage 4 students had more than 80% of their answers correct. Other than for stage 1, a large proportion (42.2% of stage 2 students, 47.0% of stage 3 students and 48.5% of stage 4 students) scored lower than 50%.

Table 9.44: Distribution of students' ITLA Section 1 scores

% correct	Stage 1 (N = 46)	Stage 2 (N = 28)	Stage 3 (N = 84)	Stage 4 (N = 10)
<50%	3.7	42.2	47.0	48.5
50% – 80%	93.1	39.4	51.1	42.1
>80%	3.2	18.4	1.9	9.4
Total	100	100	100	100

ITLA Section 2 (Self-perceived ability in generic IT skills)

Tables 9.45 to 9.48 show the students' self-perceptions of their proficiency on various IT-related tasks. 80% or more of the students indicated that they are basically or highly proficient at switching the computer on (80% of Stage 1, 84.2% of Stage 2, 87.3% of Stage 3 and 88.6% of Stage 4 students).

The highest frequencies of Stage 1 students indicated that they are basically or highly proficient at inputting Chinese text (67.9%), editing images or typesetting (60.2%) and doing homework or writing reports (48.8%). The items rated by the fewest Stage 1 students include creating statistical diagrams (32.4%), databases (20.3%) and WebPages (11.2%), protecting computers from virus or hacker attacks (18.3%) and discussing in newsgroups or discussion forums (19.2%).

The highest frequencies of Stage 2 students reporting being basically or highly proficient are for editing an image or typeset (73%), delivering documents/information to others (65.8%) and using the Internet securely (66.5%). The lowest frequencies are for solving problems related to daily life (44.9%), producing a multimedia clip/animation (31.8%) and creating/using a database (36.7%). Overall more Stage 2 students rated themselves as basically or highly proficient than Stage 1 students.

The highest percentages of Stage 3 students rated themselves as basically or highly proficient on using computer software for self learning (81.7%), searching for information from the Internet (76.8%), delivering documents/information to others (69.9%), downloading information/software from the Internet (69.2%) and creating presentation materials (67.5%). The items on which the fewest Stage 3 students rated themselves to be at least basically proficient are creating/using a database (27.3%), solving problems related to daily life (38.9%) and creating a webpage/set up a website (39.5%).

For the Stage 4 students the highest numbers rated themselves as at least basically proficient on searching for information on the Internet (98.1%), inputting Chinese texts (96.1%), creating presentation material (86.6%) and solving problems related to learning (86.6%). The lowest numbers rated themselves proficient on solving problems related to daily life (30.7%), sharing/discussing in a news group/discussion forum (30.7%), "creating/using a database (32.7%) and editing an image or typeset (32.2%).

It can be seen that there is a common pattern across all stages for Internet-related skills to be amongst those on which the higher percentages of students consider themselves to be at least basically proficient. When we look at the generic ability to make use of IT to solve problems related to learning, we see that only around half of the students perceive themselves to know the basics, but with a steady increase across stages (25.8% of Stage 1, 54% of Stage 2, 56.7% of Stage 3 and 86.6% of Stage 4 students). Similarly, the numbers rating themselves as at least basically proficient in using IT to solve problems related to daily life are low (21.4% of Stage 1, 44.9% of Stage 2, 38.9% of Stage 3 and 30.7% of Stage 4 students). There is an increase at Stages 2 and 3, but then a drop again with Stage 4.

Table 9.5f (appended at the end of this section) shows that the Stage 1 HI students' mean scores were higher than the norm on several items: using computer software for self learning (3.2), inputting Chinese characters (4.0), using IT for homework or reports (3.6), creating presentation materials (2.0), searching the Internet for information (3.9), creating a web page or website (1.3), creating/using a database (1.4), using the Internet securely (3.0), protecting the computer from a virus or hacker (2.7) and using IT to solve problems related to learning (2.9) and daily life (1.4). The H students had mean scores higher than the norm on several items: switching the computer on and shutting down correctly (4.0), use of software for self learning (2.8), use of electronic/Internet dictionary/encyclopedia (2.1), creating presentation material (2.3), searching for (2.8) downloading (2.9) material from the Internet, producing a multi-media clip/animation (2.3), sharing/discussing in a newsgroup/forum (1.9), distinguishing the credibility of Internet information/news (2.3), using the Internet securely (2.2) and delivering documents to others (2.6). The SD students had mean scores higher than the norm on several items: switching the computer on and shutting down correctly (3.9), use of software for self learning (2.7), use of electronic/Internet dictionary/encyclopedia (2.4), creating a webpage/setting up a website (1.2), creating/using a database (1.5), downloading material from the Internet (2.2), producing a multi-media clip/animation (1.4), sharing/discussing in a newsgroup/forum (1.5), distinguishing the credibility of Internet information/news (2.0), and using the Internet securely (2.3). The PH students had means that were lower than the norm on 12 items and the VI students had means that were lower than the norm on 9 items that included use of an electronic dictionary/encyclopedia (0.5 and 0.3 respectively), and sharing and discussing in a newsgroup/forum (0.2 and 0.3). However, the PH students were higher than average on editing an image or typeset (3.2) and the VI students were higher than average on Internet security (3.3) and protecting the computer from a virus or hacker (2.3), solving problems related to daily life (1.3).

In Table 9.5g there are three distinct patterns for the Stage 2 students. The H students had mean scores higher than the norm on all items (2.9 to 4.0) with the exception of producing a multimedia clip and creating/using a database. A similar pattern occurred for the HI students with higher than average means for a number of items: switching the computer on and shutting down correctly (4.0), using computer software for self learning (3.6), inputting Chinese texts (3.4), doing homework/writing reports (2.9), creating presentation materials (2.9), producing a multi-media clip/animation (2.8), editing an image or typeset (3.4), using the Internet securely (3.4) and solving problems related to learning (2.5). The VI students had lower means on fifteen items (0 to 1.3).

For Stage 3 students (Table 9.5h) the HI and H students again had higher than average means on a number of items including using electronic/Internet dictionary/encyclopedia (3.3 and 3.0 respectively), inputting Chinese text (3.9 for each), creating presentation materials (3.3 and 2.9), protecting the computer from a virus/hacker (2.6 and 2.9), delivering documents/information to others (both 3.7) and solving problems related to learning (3.2 and 3.0). The PH students had higher than average means on four items: using computer software for self learning (3.7), creating presentation materials (3.7), and editing an image or typeset (3.7). For Stage 4 students (Table 9.5i) there is only one group that differs significantly from the overall mean. The HI students had a lower mean on one item, switching on and shutting down the computer (3.1), and higher than average on two: editing an image or typeset (2.9) and delivering documents/information to others (3.4).

Table 9.45: Distribution of students' scores in ITLA Section 2 – Stage 1 (ITLA, Section 2, Q. 1-20)

Self-perceived proficiency	Mean (0-4)	SE	N	% of students choosing the option				
				Highly proficient	Basically proficient	Know some	Not proficient	Know nothing at all
Switch the computer on and shutdown correctly	3.4	0.04	45	76.7	3.3	11.8	8.3	0.0
Use computer software for self learning	2.1	0.07	45	27.5	17.6	27.4	4.5	23.0
Use an electronic/Internet dictionary/ encyclopedia	1.2	0.06	44	9.8	19.5	15.4	5.0	50.3
Input Chinese texts	3.2	0.03	45	57.6	10.3	28.7	0.0	3.4
Do homework/write reports	2.3	0.08	45	39.9	8.9	20.7	15.3	15.3
Create statistical diagrams	1.5	0.09	44	3.4	29.0	14.6	20.5	32.5
Create presentation materials	1.3	0.05	44	7.3	13.6	25.3	28.4	25.4
Search for information from the Internet	2.0	0.04	44	37.8	9.2	11.9	17.0	24.1
Create a webpage/set up a website	0.7	0.04	44	2.6	8.6	20.2	6.3	62.4
Produce a multimedia clip/animation	0.8	0.05	43	12.3	2.9	14.1	15.9	54.9
Edit an image or typeset	2.7	0.07	43	48.1	12.1	16.3	1.8	21.8
Create/use a database	0.7	0.05	44	3.4	16.9	2.6	12.5	64.6
Share/discuss in a news group/discussion forum	0.9	0.05	43	7.9	11.3	6.2	22.9	51.7
Download information/software from the Internet	1.3	0.06	42	15.7	18.1	11.3	14.7	40.1
Distinguish the credibility of Internet information/news	1.5	0.06	43	8.1	27.4	17.8	8.4	38.4
Use Internet securely	1.6	0.05	42	21.9	21.7	9.4	9.6	37.5
Protect the computer from a virus/hacker attack	1.2	0.04	41	18.3	0.0	23.3	9.1	49.4
Deliver documents/information to others	1.5	0.06	43	22.8	8.6	12.0	15.9	40.8
Solve problems related to learning	1.7	0.07	43	16.3	9.5	38.1	2.8	33.3
Solve problems related to daily life	0.8	0.05	42	2.9	18.5	3.0	12.6	63.0

Table 9.46: Distribution of students' scores in ITLA Section 2 – Stage 2 (ITLA, Section 2, Q. 1-20)

Self-perceived proficiency	Mean (0-4)	SE	N	% of students choosing the option				
				Highly proficient	Basically proficient	Know some	Not proficient	Know nothing at all
Switch the computer on and shutdown correctly	3.3	0.04	28	72.4	11.8	8.7	0.0	7.1
Use computer software for self learning	2.5	0.04	28	43.7	20.9	21.1	1.0	13.2
Use an electronic/Internet dictionary/ encyclopedia	2.2	0.04	28	21.9	36.9	18.8	4.3	18.1
Input Chinese texts	2.5	0.04	28	46.4	5.3	35.8	1.4	11.1
Do homework/write reports	2.3	0.05	28	34.4	14.2	34.9	2.6	13.8
Create statistical diagrams	2.3	0.04	28	31.0	20.3	32.4	1.0	15.2
Create presentation materials	2.4	0.05	28	39.8	5.3	37.7	1.0	16.3
Search for information from the Internet	2.6	0.04	27	45.8	18.3	19.5	2.7	13.7
Create a webpage/set up a website	2.3	0.04	27	27.7	19.1	39.0	0.0	14.3
Produce a multimedia clip/animation	2.0	0.06	28	28.2	3.6	33.0	1.4	33.7
Edit an image or typeset	2.7	0.04	27	40.8	32.2	13.8	4.1	9.1
Create/use a database	1.8	0.05	28	21.5	15.2	11.1	26.3	25.9
Share/discuss in a news group/discussion forum	2.0	0.05	26	19.1	31.3	19.6	12.6	17.4
Download information/software from the Internet	2.4	0.05	28	38.7	21.4	16.3	11.9	11.6
Distinguish the credibility of Internet information/news	2.4	0.05	28	33.7	28.0	7.1	20.1	11.2
Use Internet securely	2.3	0.05	28	41.8	24.7	3.5	8.7	21.4
Protect the computer from a virus/hacker attack	2.0	0.05	28	25.2	21.9	6.6	29.8	16.5
Deliver documents/information to others	2.5	0.05	28	39.2	26.6	6.1	17.4	10.8
Solve problems related to learning	2.0	0.05	28	20.9	33.1	10.1	9.7	26.2
Solve problems related to daily life	2.0	0.05	28	36.0	8.9	17.1	21.3	16.7

Table 9.47: Distribution of students' scores in ITLA Section 2 – Stage 3 (ITLA, Section 2, Q. 1-20)

Self-perceived proficiency	Mean (0-4)	SE	N	% of students choosing the option				
				Highly proficient	Basically proficient	Know some	Not proficient	Know nothing at all
Switch the computer on and shutdown correctly	3.6	0.02	83	73.1	14.2	10.8	0.0	2.0
Use computer software for self learning	3.0	0.03	83	32.4	49.3	8.8	2.6	6.9
Use an electronic/Internet dictionary/ encyclopedia	2.4	0.04	82	26.0	35.5	16.4	3.4	18.7
Input Chinese texts	2.9	0.05	83	47.2	16.1	21.1	10.0	5.5
Do homework/write reports	2.7	0.05	83	27.9	34.6	15.6	14.4	7.6
Create statistical diagrams	2.5	0.03	83	21.2	34.9	21.8	17.0	5.2
Create presentation materials	2.7	0.07	83	23.7	43.8	16.1	5.4	10.9
Search for information from the Internet	3.0	0.05	80	43.9	32.9	9.4	7.6	6.2
Create a webpage/set up a website	2.0	0.04	83	8.8	30.7	33.4	15.9	11.1
Produce a multimedia clip/animation	2.0	0.03	83	15.1	26.4	15.9	22.0	20.7
Edit an image or typeset	2.6	0.03	83	27.1	36.3	16.7	11.4	8.5
Create/use a database	1.6	0.05	83	7.9	19.4	26.6	9.7	36.4
Share/discuss in a news group/discussion forum	2.1	0.03	82	22.5	27.6	20.8	11.3	17.9
Download information/software from the Internet	2.6	0.04	83	26.9	42.3	9.5	12.9	8.4
Distinguish the credibility of Internet information/news	2.2	0.03	82	20.0	30.1	24.6	7.1	18.2
Use Internet securely	2.6	0.05	79	27.6	34.5	12.8	12.8	12.3
Protect the computer from a virus/hacker attack	2.0	0.04	83	11.9	38.8	18.1	9.4	21.9
Deliver documents/information to others	2.7	0.04	83	42.6	27.3	10.0	5.1	15.1
Solve problems related to learning	2.2	0.03	83	16.3	40.4	13.0	16.2	14.1
Solve problems related to daily life	1.9	0.03	83	14.0	24.9	20.2	23.8	17.1

Table 9.48: Distribution of students' scores in ITLA Section 2 – Stage 4 (ITLA, Section 2, Q. 1-20)

Self-perceived proficiency	Mean (0-4)	SE	N	% of students choosing the option				
				Highly proficient	Basically proficient	Know some	Not proficient	Know nothing at all
Switch the computer on and shutdown correctly	3.6	0.02	10	77.2	11.4	11.4	0.0	0.0
Use computer software for self learning	2.7	0.01	10	0.0	63.4	34.7	0.0	0.0
Use an electronic/Internet dictionary/ encyclopedia	2.6	0.03	10	21.3	40.1	15.4	23.3	0.0
Input Chinese texts	3.4	0.03	8	52.0	44.1	4.0	0.0	0.0
Do homework/write reports	2.9	0.04	10	20.8	44.5	32.7	2.0	0.0
Create statistical diagrams	2.4	0.03	10	9.4	34.7	34.7	21.3	0.0
Create presentation materials	3.1	0.03	10	18.8	67.8	13.4	0.0	0.0
Search for information from the Internet	3.8	0.03	10	84.7	13.4	2.0	0.0	0.0
Create a webpage/set up a website	2.7	0.05	10	9.4	44.5	40.1	4.0	2.0
Produce a multimedia clip/animation	2.4	0.02	10	0.0	55.9	30.7	13.4	0.0
Edit an image or typeset	2.4	0.02	9	2.0	30.2	67.8	0.0	0.0
Create/use a database	2.0	0.04	10	0.0	32.7	40.1	25.2	2.0
Share/discuss in a news group/discussion forum	1.9	0.03	10	0.0	30.7	46.1	2.0	21.3
Download information/software from the Internet	2.6	0.03	10	2.0	55.9	42.1	0.0	0.0
Distinguish the credibility of Internet information/news	2.5	0.02	9	0.0	47.3	52.7	0.0	0.0
Use Internet securely	2.6	0.03	10	9.4	55.9	13.4	21.3	0.0
Protect the computer from a virus/hacker attack	2.6	0.04	10	13.4	42.6	40.1	0.0	4.0
Deliver documents/information to others	2.8	0.02	10	22.8	46.5	9.4	21.3	0.0
Solve problems related to learning	3.0	0.04	10	18.8	67.8	11.4	2.0	0.0
Solve problems related to daily life	2.1	0.03	10	0.0	30.7	55.9	11.4	2.0

ITLA (Task-oriented)

Based on realistic expectations that different degrees of IT competence can be attained by students with different levels of mental handicaps, the MH students were divided into two further stratifications for the assessment of IT literacy. These stratifications were Mild Mental Handicaps (MMH) and Moderate/Severe Mental Handicaps (Mod/SMH). For MMH schools, students were assessed on their basic level of skill/knowledge, daily application of IT skill/knowledge and level of keyboard skill/knowledge. For Mod/SMH schools, students were assessed on their ability to use IT in learning, which was divided into six categories: start the computer, start the software, browse the software that is used frequently, switch to browsing another window, close the window and shut down the computer. These six categories were identified because Mod/SMH students mainly use IT for sensory stimulation, basic sensori-motor and cognitive training, simple academic skills training and augmented communication training. Generally activities within these categories are customised to allow maximum learning effect with minimum active participation as most students are not able to participate actively due to their severe deficits.

Task-oriented ITLA items for MMH students

It was found on the task-oriented items that high percentages of the MMH students were able to complete the following tasks individually: moving the cursor to a specific location (76.1%), exiting from the application/software (75.2%), starting the computer (63.5%) and software (69.1%). On the other hand, high percentages of the students were unable to explain the reason why a specific application/software operates in certain computers but not others (78.7%), know the three stages of processing data: input, process and output (71.9%), save information from the computer (e.g. address book)(66.2%) and input/output methods with aids from the computer (67.5%). There were several tasks that less than 31% of the students were able to complete individually but that more than one-third of them were able to complete with help from others: managing files (36.4%), handling advanced skills of specific software (36.8%), deleting an unused file (30.8%), understanding software-related jargon (30.5%) and understanding hardware-related jargon (30.4%).

Referring to their daily applications of IT skill/knowledge, the task on which the highest percentage of students were successful individually was using an Internet browser (43.3%). This was followed by some keyboard skills/knowledge: backspace (39.8%), Ctrl+Alt+Del (36.7%) and Caps Lock (35.8%). There were some further tasks on which 15% or fewer were able to perform individually but that around one-third could complete with assistance: Insert (33.5%), Page Up/Page Down (31.8%), Number Lock (30.9%) and Escape (29%). It can be seen that around one-quarter of the students needed help from others to use an Internet browser and one-fifth of them needed help from others to search for daily information from the Internet browser (20%) or obtain school status and news from the school web site (21.3%) individually without support from others.

The results indicated a number of tasks that students were unable to complete either individually or with assistance. High percentages were unable to explain the characteristics of the Chinese operating system (77%), install Chinese software (75.6%), explain the Chinese operating system with comparison to English operating system (78.3%), resolve basic problems for operating a Chinese computing system (76%), communicate with others through Chinese computing system (75.6%), introduce the two most popular input methods for Chinese characters in the Chinese operating system (72.6%) and create a poster by the existing software tools with Chinese characters embedded (71.8%). As well, a comparatively large percentage of students were unable to communicate with others through the Internet (68.4%), or to search for daily information from the Internet browser (e.g. weather, listening to the music, etc.)(50%) or obtain school status and news from the school web site (50.7%).

Task-oriented ITLA items for Mod/SMH students

As mentioned earlier, there were six categories of task-oriented items used to assess the IT literacy ability of the Mod/SMH students: start the computer, start the software, browse the software that used frequently, switch to browsing another window, close the window and shut down the computer.

More than 50% of the Mod/SMH students were unable to complete the listed tasks on the ITLA, with the exceptions of finding the location of the 'Power' button (38.1%), pressing the 'Power' button (30.5%), finding the correct icon by using the mouse or keypads (44.8%) and starting the software by using the mouse (48.1%). This might imply (1) more effective computer accessibility training should be customized for this student groups; (2) ITEd objectives and activities (e.g., hardware and software design) should be customized/adjusted according to individual student's ability to participate; (3) basic skills training, e.g., cognitive and physical skills, etc. should be reinforced in order to enable the students to participate in their learning (including ITEd learning); (4) holistic and student-type specific ITEd curriculum planning and implementation is recommended.

Of those who were able to respond, 28.6% could press the 'Power' button with no prompt and 24% could find the location of the 'Power' button with no prompt. Gesture prompts enabled 14.6% to close the software by the mouse or keypads on the keyboard, 17.2% to show the location of the 'Power' button, 17.1% to press the 'Power' button and 11.5% to find the correct icon by using the mouse or keypads on the keyboard. With physical and manual guidance 19.1% of the students were able to start the software by using the mouse or keypads on the keyboard, 19.2% were able to find the correct icon by using the mouse or keypads on the keyboard and 10.2% were able to browse frequently-used software by using the mouse or keypads on the keyboards.

9.5.6 Students' attitudes towards IT

Item 28 in the Students' Questionnaire was written in behavioural terms to reflect the appropriateness of students' attitudes towards computer use. 62.3% of students reported that they usually or always spend long periods of time playing computer/online games during holidays. Otherwise, however, the responses to this item demonstrate that there is some level of awareness and, generally, around 70% or more do not engage in inappropriate practices. It is interesting to note that use of IT to share views, feelings or interests with others was only rated occasionally or always by about 38.5% of students, which is perhaps not as high as expected since an aim of ITEd is to promote this kind of sharing.

With regard to a different aspect of students' attitudes, some insights were also gained into their opinions about how they would like to use IT. The viewpoints of students gathered in the student focus group interview indicate the students' ideas about the activities they would prefer to use IT for.

> *For example, we (students) would like the principal to assign more time for us to use ICQ for communicating with others, for example during class break and lunch break, which are times when we are currently not able to use the IT facilities at school. We want to have more time/IT classes to learn IT skills. Also, we want help from the school to find information and communicate with friends or classmates. In addition, we want to communicate with teachers to get notes or information, learning assistance and review of work. I would like the school to teach me how to search properly for educational information so that I can strengthen what has learned and further the study on that subject.*

Another group of students also reflected their views as:

> *We would like the school to provide more IT classes and tutorships for assistance in our studies. We also want the school to strengthen the control of accessing porn websites at school. For the IT classes, we would like more courses on the Chinese input method, as well as typing and word processing. We also want to have more educational games to make studies more interesting, as well as more equipment to assist learning IT.*

9.5.7 Perceived impacts of IT on students

Table 9.49: Heads' perceptions of impacts on students (School Heads' Questionnaire, Q.8c)

Impacts	Mean (0-4)	SD	N	% of heads choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
Increased subject knowledge	3.1	0.6	65	18.5	76.9	3.1	0.0	1.5
Improved computer skills	3.1	0.7	65	26.2	61.5	9.2	1.5	1.5
Enhanced creativity	2.9	0.6	65	12.3	66.2	20.0	1.5	0.0
Improved communication and expression skills	2.8	0.7	65	13.9	56.9	24.6	4.6	0.0
Strengthened co-operation with others	2.5	0.8	65	4.6	47.7	38.5	7.7	1.5
Weakened interpersonal skills due to excessive time spent on computers	1.6	0.8	65	1.5	12.3	38.5	43.1	4.6
Negligence of school work due to excessive time spent on computers	1.3	0.8	65	1.5	4.6	29.2	49.2	15.4
Stimulated interest in learning	3.3	0.5	65	29.2	70.8	0.0	0.0	0.0
Increased initiative to learn	3.0	0.6	65	18.5	64.6	16.9	0.0	0.0
Increased confidence	2.8	0.7	65	12.3	58.5	27.7	1.5	0.0
Improved learning effectiveness	3.1	0.5	64	15.6	75.0	9.4	0.0	0.0
Widened perspective through enlarged social circle	2.4	0.8	65	6.2	40.0	41.5	10.8	1.5
More opportunity for being exposed to unhealthy information	2.0	0.9	65	1.5	32.3	38.5	24.6	3.1
Developed high-level thinking	2.4	0.6	65	1.5	40.0	55.4	3.1	0.0

As can be seen in Table 9.49 above (School Heads' Questionnaire item 8c), school heads agreed or strongly agreed that ITEd has impacted on their students in the following ways: stimulating interest in learning (100%), increasing subject knowledge (95.4%), improving learning effectiveness (90.6%), improving computer skills (87.7%), increasing initiative to learn (83.1%), enhancing creativity (78.5%), improving communication and expression skills (70.8%), increasing confidence (70.8%) and strengthening cooperation with others (52.3%). Relatively low proportions agreed that there have been negative impacts such as weakening interpersonal skills due to excessive time spent on computers (13.8%), and negligence of school work due to the same reason (6.1%). The school heads' mean ratings for corresponding items on the Preliminary Study were very similar to these.

Table 9.5j (appended at the end of this section) does not reveal any particular patterns in school heads' perceptions of impacts of IT on students across school types. The MmodMH heads rated 'increased subject knowledge' higher than the overall mean (3.6 on a scale from 0 to 4 where 4 represents 'strongly agree') and the HI heads rated 'improved communication and expression skills' (3.5) and 'strengthened co-operation with others' (3.0) higher than the overall mean. The SMH heads gave lower mean ratings for increased subject knowledge (2.6), improved computer skills (2.1) and negligence of school work due to excessive time spent on computers (0.7). The SD heads had a lower rating for improved communication and expressions skills (2.1).

Similar to the pattern for school heads, as can be seen from Table 9.50 (Teachers' Questionnaire item 14e), 93.7% of the teachers agreed or strongly agreed that using computers can stimulate students' interest in learning and increase their initiative to learn (80.5%). Other impacts agreed/strongly agreed to by high percentages of teachers are: increased students' subject knowledge (92.3%), improved learning effectiveness (83.6%), increased confidence (65.2%), and easier and deeper understanding of the lesson (78.3%). Comparatively, less of them agreed or strongly agreed that using computers can allow students to have greater concentration in learning (71.1%), improve their communication and expression skills (65.8%) and help them to learn cooperatively with others (57.6%).

Table 9.50: Teachers' perceptions of benefits to students of IT use in the lesson/s with which they felt the most satisfied (Teachers' Questionnaire, Q.14e)

Benefits	Mean (0-4)	SE	N	% of teachers choosing the option				
				Strongly agree	Agree	Neutral/ uncertain	Disagree	Strongly disagree
Increased subject knowledge	3.2	0.03	622	28.8	63.5	5.8	1.9	0.0
Improved computer skills	2.4	0.05	617	10.4	38.7	32.4	15.7	2.9
Improved information processing ability	2.3	0.06	617	8.1	39.1	31.6	15.7	5.5
Enhanced creativity	2.4	0.05	619	10.0	37.1	37.6	11.4	3.9
Improved communication and expression skills	2.7	0.04	618	11.1	54.7	24.7	7.3	2.2
Learned to co-operate with others	2.5	0.05	617	9.6	48.0	29.2	10.4	2.9
Stimulated interest in learning	3.2	0.03	624	30.5	63.2	5.5	0.4	0.4
Increased initiative to learn	3.0	0.03	620	21.1	59.4	18.0	1.2	0.4
Increased confidence	2.7	0.03	616	13.8	51.4	27.2	6.1	1.4
Improved learning effectiveness	3.0	0.05	617	20.0	63.6	13.4	2.4	0.6
Enlarged social circle	2.1	0.05	614	5.2	23.4	49.9	15.6	6.0
Widened perspective through more interaction with the outside world	2.6	0.07	619	12.5	49.0	27.2	7.1	4.3
Greater concentration in learning	2.8	0.02	620	14.2	56.9	24.4	3.9	0.6
Easier and deeper understanding of the lesson	2.9	0.03	621	15.3	63.0	19.3	1.8	0.7
Clear progress in academic performance	2.4	0.04	616	5.8	34.6	50.9	6.8	1.9

The heads' and teachers' perception of increased interest is further supported by the students' views of what they have gained from IT use in class (Table 9.51, Students' Questionnaire item 13b). The highest reported gains are increased subject knowledge (85% saying they agreed/strongly agreed this was a gain) and stimulated interest to learn (81.7%). The lowest reported gains are enlarged social circle (58.8%) and improved communication and expression skills (59.8%).

Table 9.5k (appended at the end of this section) reveals little differences across school types. The SMH teachers rated improved information processing ability (1.8 on a scale of 0 to 4 where 4 represents 'strongly agree') lower than the overall mean. Similarly, Table 9.5*l* shows only three school types that differed significantly from the overall mean. The HI students gave higher mean perceptions for improved computer skills (3.4), learning to co-operate with others (3.5), enlarged social circle (3.0) and widened perspective through more interaction with the outside world (3.1). The H students gave higher ratings for stimulated interest in learning (3.6), increased initiative to learn (3.4) and enlarged social circle (3.1). They gave lower than average mean ratings for enhanced creativity (1.9) and improved communication and expression skills (1.1). The PS students gave a lower than average mean rating for increased confidence (2.0).

Table 9.51: Students' perceptions of what they have gained from IT use in class (Students' Questionnaire, Q. 13b)

Perceived gain	Mean	SE	N	% of students choosing the option				
				Strongly Agree	Agree	Neutral/ uncertain	Disagree	Strongly Disagree
Increased subject knowledge	3.0	0.04	229	27.3	57.7	6.7	8.0	0.4
Improved computer skills	2.9	0.04	227	20.5	58.3	12.0	7.4	1.8
Improved information processing ability	2.6	0.05	223	12.6	46.0	30.0	10.2	1.2
Enhanced creativity	2.7	0.06	224	20.0	47.4	16.7	14.6	1.3
Improved communication and expression skills	2.5	0.05	223	15.5	44.3	19.5	14.9	5.8
Learned to co-operate with others	2.8	0.05	225	24.3	47.1	17.3	10.4	1.0
Stimulated interest in learning	3.0	0.05	221	31.8	49.9	10.3	5.5	2.6
Increased initiative to learn	2.9	0.04	223	24.0	52.9	14.3	6.9	2.0
Increased confidence	2.7	0.05	223	16.1	52.1	20.8	10.1	1.0
Improved learning effectiveness	2.6	0.06	220	16.8	47.5	21.6	11.8	2.4
Enlarged social circle	2.5	0.08	222	15.8	43.0	22.0	14.7	4.4
Widened perspective through more interaction with the outside world	2.6	0.06	221	21.1	41.6	16.7	18.7	1.9

The above patterns are supported further by the students' perceptions of the impact of their teachers using IT as opposed to using it themselves in class (Students' Questionnaire, item 10). Reasonably high percentages of students agreed or strongly agreed that using computers for teaching can make the class become more interesting (74.2%) and easier (72.3%) or computers can help them tackle some of the learning problems (72%). 46% of them agreed or strongly agreed that it is difficult to do homework if they have no computers at home. 66.9% agreed or strongly agreed that their academic performance has improved by using computers

Generally the mean ratings shown in Table 9.50 (Teachers' Questionnaire, item 14e) are slightly higher relative to the corresponding means in the Preliminary Study, but only by half a point or less. The mean ratings shown in Table 9.51 (Students' Questionnaire item 13b) are very close to the corresponding means in the Preliminary Study, and differ by half a point or less.

9.5.8 Impediments to use of IT as perceived by the students

Only 30.9% of the students (Students' Questionnaire, item 26) mentioned that they saw having insufficient computer facilities at home as an obstacle. This was followed by insufficiency of time for using computer facilities at school (28.3%), parents failing to recognise the importance of IT or misunderstand the reasons for using computers (26.2%).

9.5.9 Findings from the qualitative data

Generally, students showed positive attitudes towards using IT in learning. They said that IT use can help them in knowledge acquisition and skills development; to express themselves efficiently and effectively; to organise data and record information; and to share ideas with others. Different special school student groups showed different computer usage patterns. For example, students of SOS and PH schools use computers similarly to students in regular schools. However for students with visual impairment or severe mental handicaps, independent computer use at home is not possible since special interfaces or assistive devices are lacking.

From the classroom observations in all school types, it was found that the students' attention seemed to be captured by the colour and animations presented by the IT. In one MMH School, it was observed that the teacher opened photo editor software to let students see and understand different objects, for example cakes, birds and scenery, through showing and zooming photos of the objects.

However, students' feelings about IT use might differ for respective disability groups. The students' perception depends on what and how the IT uses can empower their learning. For example some said that they like to study with IT resources and activities and the others said that they are more interested in playing games or communicating with others rather than using IT for learning.

Some students with physical disabilities reported in interviews that they like IT because, besides learning, it can help them in other ways. For example those who do not have control of their motor skills can write more easily. Moreover, in a way, IT use brings them closer to the ability of normal students. Because some of the students get to learn how to use IT, it can also help to bridge the gap among family members because they can participate with other family members together. IT can help to provide some compensation for their disabilities so they can interact more equally with their family members.

Students with hearing impairments reiterated what the parents said, that using IT can help them to communicate more effectively with others, since it is often difficult for them to speak clearly enough even for their parents to understand their meaning. There are some suggestions from the student interviews that the use of IT can lead to greater happiness or satisfaction for some special school students. Two students with mild mental handicaps said that they felt better being able to communicate with others through using IT. They thus felt being more accepted by the others. Another student said that although she does not have enough confidence to communicate with others through using IT, she is happy when she uses the computer for painting. This makes her feel happy as she can use IT for self expression. Students with severe mental handicaps seem to like IT very much because of the colours and sounds that attract their attention and make them feel ‘excited’. Students of Skill Opportunity Schools said that they were more interested in using computers for games because they were frustrated by having insufficient knowledge or skills to use computers for other pursuits. Some students with physical handicaps expressed that they have difficulties in accessing computers and this thus affects their interest and motivation to use them.

One student of a SD School said that he spends less time with his parents because of using the home computer for ICQ. This phenomenon was also expressed by several parents in interviews. Nevertheless, it is encouraging to see that IT uses were reported to have positive impacts on students of social development schools. Some students said they have developed better relationships with their friends, classmates, relatives or parents after using IT to communicate with them.

Students with visual impairment held different opinions about the impacts of IT on their daily living. One agreed that IT has been providing convenience to his daily living pursuits, such as using a computer to translate written words to Braille words. While some mentioned that it is difficult for them to use computers because of their visual impairments, others reflected a lacking of suitable assistive devices to support their computer access. Students generally agreed there is a lot of potential to make use of IT to fulfill study and daily living needs of students with visual impairments. However this potential is not being fully utilised due to many reasons, including shortage of customised hardware and software, and limited number of computers.

Some students said that they do not know much about IT knowledge and skills, so they need to ask for help from classmates and teachers. They expressed that, with IT competence, they can communicate with others more easily and feel that they are more capable and being accepted by the others.

To summarize, IT usage might not have the same impact on improving student learning outcomes for all special school students, but it can increase their interest in learning and be a mediator for learning. Moreover, students are trained with various techniques such as drawing techniques. Simultaneously, students can be developed to be more creative and self-motivated. By using computers or IT, students can do what they originally or previously could not do. So, they will gain much more confidence in learning and in their lives.

About the teachers’ viewpoints, the teachers who were interviewed said that their students generally find IT interesting. Compared to conventional teaching, IT can arouse the students’ attention more easily because of the visual and sound effects. The use of games in teaching is also appealing to them. For example, teachers of mentally handicapped students mentioned they had previously had to prepare courseware in physical form before the introduction of ITEd. Now with the help of educational computer games, students can learn better through repetition. Moreover, immediate and explicit feedback provided by the software can help students to learn better.

Table 9.5a: Nature of IT use reported by students (Students' Questionnaire, Q. 23)

	Teacher answered									
	Overall		**PH**		**ModMH**		**MmodMH**		**SMH**	
	%	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**
a.	3.6	64	50.0	2	0.0	32	0.0	19	18.2	11
b.	3.3	64	0.0	2	0.0	32	0.0	19	27.3	11
c.	54.3	79	50.0	2	69.6	33	24.1	19	72.4	25
d.	8.3	63	0.0	2	7.3	32	0.0	19	40.0	10
e.	38.3	79	0.0	2	43.0	33	6.3	19	86.2	25

	Student answered																							
	Overall		**PH**		**MMH**		**ModMH**		**MmodMH**		**SMH**		**SD**		**HI**		**VI**		**H**		**PS**		**SOS**	
	%	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**
a.	50.6	224	24.9	17	33.3	30	-	-	60.6	18	-	-	64.0	43	71.9	29	11.1	9	82.0	18	82.2	30	46.7	30
b.	38.2	225	34.6	17	23.1	31	-	-	35.1	18	-	-	43.2	43	76.0	29	0.0	9	83.9	18	35.6	30	34.9	30
c.	48.4	227	46.0	17	35.7	31	-	-	73.0	20	-	-	61.1	43	64.6	29	22.2	9	90.8	18	31.2	30	31.7	30
d.	39.8	222	28.7	17	35.7	31	-	-	52.6	19	-	-	47.9	42	39.3	29	33.3	9	35.1	18	23.6	28	49.2	29
e.	45.1	224	28.9	17	35.9	31	-	-	51.8	18	-	-	52.9	42	67.5	30	0.0	9	33.7	18	31.4	29	65.4	30

Nature of use
a. Communicating with others
b. Collaborating with others
c. Self-learning
d. Tackling practical problems in daily life
e. Doing creative work
%=percentage choosing options of 'always' or 'occasionally'; N= Total number of students

Table 9.5b: Average time spent per week by students on various activities as reported in the IT Activity Daily Log.

	Overall				**PH**				**MMH**				**ModMH**				**MmodMH**				**SMH**			
	T	**I**	**P**	**L**	**T**	**I**	**P**	**L**	**T**	**I**	**P**	**L**	**T**	**I**	**P**	**L**	**T**	**I**	**P**	**L**	**T**	**I**	**P**	**L**
a.	125.5	3.7	3.5	4.1	100.0	4.1	3.6	4.1	236.2	4.4	3.9	4.3	56.8	4.1	4.1	4.1	86.1	4.2	4.0	4.3	-	-	-	-
b.	33.5	3.7	3.3	3.9	6.3	3.8	3.0	3.0	34.7	4.8	3.9	4.1	0.0	-	-	-	16.3	3.6	3.4	3.9	-	-	-	-
c.	16.4	3.6	3.5	3.8	12.5	3.2	3.0	4.2	9.0	4.1	4.6	5.0	10.7	4.0	4.0	3.0	6.3	4.5	4.1	4.1	-	-	-	-
d.	12.5	3.3	3.4	3.3	0.0	-	-	-	7.0	4.4	4.4	4.0	0.0	-	-	-	0.0	-	-	-	-	-	-	-
e.	65.7	3.6	4.0	4.0	16.3	3.8	4.0	3.8	85.5	3.7	3.8	4.0	21.8	3.4	4.6	4.6	50.2	4.1	4.2	4.3	-	-	-	-
f.	29.4	3.2	3.7	3.7	25.0	1.8	3.0	4.1	40.5	4.4	4.3	4.6	0.0	-	-	-	24.7	3.5	3.7	4.2	-	-	-	-
g.	11.5	2.4	2.9	3.7	27.5	3.8	3.4	3.6	6.7	2.2	3.5	3.4	0.0	-	-	-	26.0	1.8	3.8	3.7	-	-	-	-
h.	102.1	4.0	4.2	4.4	5.0	3.0	3.0	3.0	31.9	3.2	3.7	4.0	128.6	4.0	4.0	4.7	55.6	3.7	4.2	4.3	-	-	-	-
i.	31.1	3.9	4.0	4.2	0.0	-	-	-	33.7	3.8	3.8	4.2	33.6	3.5	3.5	3.6	55.2	4.1	4.1	4.3	-	-	-	-

	SD				**HI**				**VI**				**H**				**PS**				**SOS**			
	T	**I**	**P**	**L**	**T**	**I**	**P**	**L**	**T**	**I**	**P**	**L**	**T**	**I**	**P**	**L**	**T**	**I**	**P**	**L**	**T**	**I**	**P**	**L**
a.	169.8	3.8	3.8	4.0	66.3	3.6	3.5	3.3	-	-	-	-	132.8	3.5	3.6	3.8	423.0	2.1	2.1	3.3	57.5	4.3	3.7	3.9
b.	0.0	-	-	-	97.3	3.8	3.2	3.5	-	-	-	-	27.5	4.9	4.8	4.7	182.5	2.6	2.4	2.2	62.5	4.6	4.6	4.3
c.	0.0	-	-	-	62.2	3.1	3.5	3.4	-	-	-	-	50.0	4.0	4.8	4.1	14.9	2.1	2.1	3.0	41.7	4.0	3.0	4.0
d.	2.7	3.0	4.0	3.0	103.5	2.7	3.5	3.3	-	-	-	-	10.9	4.0	4.0	4.0	61.5	4.0	2.6	3.1	15.0	3.2	3.8	3.2
e.	20.0	4.0	4.0	4.0	179.3	3.0	3.8	3.9	-	-	-	-	31.2	4.8	4.9	4.9	115.5	3.7	3.9	3.8	153.3	3.6	4.0	3.8
f.	16.0	4.3	4.0	4.0	28.7	3.4	3.3	3.5	-	-	-	-	25.2	2.6	4.4	4.4	161.0	2.6	3.4	2.6	27.5	3.3	4.3	4.3
g.	2.0	1.0	3.0	4.0	10.0	2.4	3.6	3.4	-	-	-	-	0.4	2.0	3.0	4.0	36.0	1.0	1.0	-	12.5	3.0	3.0	4.0
h.	342.0	4.7	4.6	4.9	132.0	2.4	4.1	4.1	-	-	-	-	201.3	2.1	4.0	4.1	466.5	4.0	4.1	4.2	68.3	3.6	3.6	3.6
i.	5.3	3.4	4.0	4.3	87.0	4.2	4.2	3.6	-	-	-	-	37.8	3.7	4.4	3.6	8.0	5.0	5.0	5.0	35.0	4.0	4.1	5.0

Activity type
a. Classroom activity
b. School works activity
c. Self-learning/studying
d. Communication
e. Browsing Internet
f. Listening Music
g. Watching Movie
h. Entertainment games
i. Learning-related games
T = Time Spent (min); I = Importance; P = Performance; L =Liking (For I, P and L, the rating scale is from 1 to 5)

Table 9.5c: Students' self-rating of personal confidence with using IT (Students' Questionnaire, Q. 30)

Confident level	Overall (N=241)	PH (N=17)	MMH (N=34)	ModMH (N=0)	MmodMH (N=24)	SMH (N=0)	SD (N=45)	HI (N=30)	VI (N=14)	H (N=18)	PS (N=30)	SOS (N=29)
	%	%	%	%	%	%	%	%	%	%	%	%
Very confident	21.7	12.1	26.4	-	21.0	-	32.0	15.6	21.4	67.7	4.4	5.1
Quite confident	34.2	43.2	43.8	-	41.2	-	23.9	43.8	42.9	14.9	17.8	18.6
Average	27.1	19.0	16.3	-	14.8	-	22.1	29.6	14.3	14.9	55.5	62.7
Not quite confident	8.0	20.7	7.2	-	5.4	-	12.5	2.9	14.3	2.5	17.8	3.4
Not confident at all	9.0	5.2	6.4	-	17.5	-	9.5	8.1	7.1	0.0	4.5	10.2

Table 9.5d: Students' self-rating of proficiency in using/operating hardware (Students' Questionnaire, Q. 21)

	Overall						PH						ModMH						MmodMH						SMH					
	M		SE		N		M		SE		N		M		SE		N		M		SE		N		M		SE		N	
a.	2.0	**0.8**	0.11	**0.07**	235	**66**	2.1	**0.3**	0.57	**0.15**	17	**4**	2.0	**1.4**	-	**0.46**	1	**31**	1.9	**0.6**	0.56	**0.26**	21	**19**	-	**0.5**	-	**0.22**	-	**12**
b.	2.0	**0.9**	0.08	**0.03**	234	**66**	1.7	**0.3**	0.41	**0.15**	17	**4**	2.0	**1.8**	-	**0.10**	1	**31**	2.3	**0.3**	0.28	**0.09**	21	**19**	-	**0.5**	-	**0.22**	-	**12**
c.	1.4	**0.3**	0.10	**0.04**	233	**66**	1.1	**0.0**	0.19	**0.00**	17	**4**	0.0	**0.2**	-	**0.19**	1	**31**	1.8	**0.4**	0.56	**0.15**	21	**19**	-	**0.4**	-	**0.18**	-	**12**
d.	1.1	**0.2**	0.10	**0.03**	233	**66**	0.6	**0.0**	0.19	**0.00**	17	**4**	0.0	**0.2**	-	**0.16**	1	**31**	1.1	**0.2**	0.50	**0.10**	21	**19**	-	**0.4**	-	**0.18**	-	**12**
e.	1.4	**0.3**	0.11	**0.04**	232	**66**	1.0	**0.0**	0.33	**0.00**	16	**4**	0.0	**0.3**	-	**0.22**	1	**31**	1.3	**0.2**	0.60	**0.10**	21	**19**	-	**0.5**	-	**0.22**	-	**12**

	MMH			SD			HI			VI			H			PS			SOS		
	M	SE	N	M	SE	N	M	SE	N	M	SE	N	M	SE	N	M	SE	N	M	SE	N
a.	1.0	0.23	33	2.3	0.18	44	3.1	0.23	30	1.8	0.37	12	3.1	0.43	18	2.7	0.25	30	2.5	0.18	29
b.	1.3	0.18	33	2.3	0.24	44	2.5	0.22	30	1.8	0.45	12	3.3	0.34	18	2.1	0.33	30	2.2	0.25	28
c.	0.6	0.14	33	1.9	0.15	44	1.9	0.20	30	0.6	0.23	11	2.6	0.68	18	1.8	0.29	30	1.8	0.17	28
d.	0.4	0.14	33	1.7	0.37	44	1.8	0.25	30	0.2	0.13	10	2.3	0.81	18	1.9	0.20	30	1.6	0.23	29
e.	0.6	0.12	33	1.8	0.34	44	2.4	0.29	30	0.9	0.24	11	2.7	0.55	18	2.1	0.27	29	2.0	0.17	29

Perceived proficiency
a. Printer
b. CD-R/CD-RW
c. Digital Camera
d. Digital Video Recorder
e. Scanner
Figures in bold represent responses given by teachers on behalf of students who were unable to answer for themselves

Table 9.5e: Students' self-rating of proficiency in software use (Students' Questionnaire, Q. 20)

	Overall						**PH**						**ModMH**						**MmodMH**						**SMH**					
	M		**SE**		**N**		**M**		**SE**		**N**		**M**		**SE**		**N**		**M**		**SE**		**N**		**M**		**SE**		**N**	
a.	2.1	**0.8**	0.10	**0.04**	229	**65**	2.4	**0.4**	0.39	**0.24**	17	**3**	-	**1.4**	-	**0.24**	-	**31**	2.5	**0.3**	0.43	**0.10**	21	**19**	-	**0.4**	-	**0.18**	-	**12**
b.	1.4	**0.3**	0.07	**0.03**	227	**65**	1.1	**0.4**	0.29	**0.24**	17	**3**	-	**0.2**	-	**0.18**	-	**31**	0.7	**0.2**	0.25	**0.08**	21	**19**	-	**0.4**	-	**0.17**	-	**12**
c.	1.5	**0.3**	0.08	**0.03**	227	**65**	1.7	**0.0**	0.19	**0.00**	17	**3**	-	**0.3**	-	**0.22**	-	**31**	1.2	**0.3**	0.35	**0.08**	21	**19**	-	**0.4**	-	**0.17**	-	**12**
d.	1.9	**0.2**	0.10	**0.03**	226	**65**	1.7	**0.4**	0.16	**0.24**	17	**3**	-	**0.2**	-	**0.16**	-	**31**	2.1	**0.2**	0.39	**0.08**	20	**19**	-	**0.4**	-	**0.15**	-	**12**
e.	2.3	**0.4**	0.09	**0.05**	225	**65**	2.2	**0.0**	0.15	**0.00**	17	**3**	-	**0.5**	-	**0.30**	-	**31**	2.3	**0.5**	0.39	**0.17**	20	**19**	-	**0.4**	-	**0.15**	-	**12**
f.	1.5	**0.2**	0.10	**0.03**	223	**65**	0.9	**0.0**	0.24	**0.00**	17	**3**	-	**0.2**	-	**0.16**	-	**31**	1.0	**0.2**	0.37	**0.08**	20	**19**	-	**0.4**	-	**0.15**	-	**12**
g.	1.8	**0.6**	0.09	**0.08**	223	**66**	2.0	**0.0**	0.41	**0.00**	17	**3**	-	**0.9**	-	**0.60**	-	**32**	1.9	**0.5**	0.37	**0.28**	21	**19**	-	**0.4**	-	**0.15**	-	**12**
h.	1.3	**0.3**	0.10	**0.04**	222	**65**	0.7	**0.0**	0.33	**0.00**	17	**3**	-	**0.4**	-	**0.28**	-	**31**	0.4	**0.2**	0.28	**0.08**	20	**19**	-	**0.4**	-	**0.18**	-	**12**

	MMH			**SD**			**HI**			**VI**			**H**			**PS**			**SOS**		
	M	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**
a.	1.6	0.27	31	1.9	0.28	42	2.8	0.36	30	2.4	0.29	11	3.1	0.46	18	1.8	0.13	30	2.3	0.20	29
b.	0.7	0.21	31	2.2	0.23	43	2.3	0.25	29	1.4	0.32	10	2.5	0.32	18	1.8	0.13	30	2.1	0.16	28
c.	0.6	0.15	30	2.1	0.20	43	2.9	0.50	29	0.9	0.38	10	3.1	0.50	18	1.9	0.16	30	2.3	0.15	29
d.	1.0	0.35	29	2.6	0.23	43	2.8	0.24	30	1.2	0.31	10	3.3	0.24	18	2.6	0.37	30	1.9	0.23	29
e.	1.5	0.23	29	2.6	0.17	43	3.1	0.20	30	2.1	0.26	10	3.3	0.35	18	2.6	0.26	30	2.5	0.34	28
f.	0.8	0.31	28	2.0	0.39	43	2.2	0.32	29	1.0	0.35	9	2.7	0.53	18	1.6	0.19	30	2.3	0.16	29
g.	1.0	0.26	28	2.5	0.22	43	2.4	0.20	29	0.4	0.23	9	2.3	0.86	17	1.6	0.24	30	2.2	0.20	29
h.	0.9	0.35	28	2.0	0.35	43	2.5	0.19	29	0.3	0.16	8	2.0	0.46	18	1.7	0.30	30	1.7	0.23	29

Perceived proficiency
a. Using word processing software
b. Using spreadsheets
c. Using presentation software
d. Using online communication tools
e. Searching and using information on the Internet
f. Designing webpages/sites
g. Designing computer graphics/drawing
h. Using multi-media software
Figures in bold represent responses given by teachers on behalf of students who were unable to answer for themselves

Table 9.5f: Distribution of students' scores in ITLA Section 2 – Stage 1 (ITLA, Section 2, Q. 1-20)

	Overall			PH			MMH			ModMH			MmodMH			SMH			SD			HI			VI			H			PS			SOS		
	M	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**
a.	3.4	0.04	45	2.8	0.51	4	-	-	0	-	-	0	-	-	0	-	-	0	3.9	0.03	20	3.8	0.29	4	3.8	0.19	5	4.0	0.04	12	-	-	0	-	-	0
b.	2.1	0.07	45	1.0	0.84	4	-	-	0	-	-	0	-	-	0	-	-	0	2.7	0.20	20	3.2	0.55	4	2.0	0.53	5	2.8	0.28	12	-	-	0	-	-	0
c.	1.2	0.06	44	0.5	0.49	4	-	-	0	-	-	0	-	-	0	-	-	0	2.4	0.16	20	1.5	0.85	4	0.3	0.24	4	2.1	0.35	12	-	-	0	-	-	0
d.	3.2	0.03	45	3.0	0.37	4	-	-	0	-	-	0	-	-	0	-	-	0	3.3	0.11	20	4.0	0.00	4	1.6	0.95	5	2.6	0.21	12	-	-	0	-	-	0
e.	2.3	0.08	45	1.7	1.09	4	-	-	0	-	-	0	-	-	0	-	-	0	1.9	0.31	20	3.6	0.48	4	2.6	0.73	5	2.6	0.18	12	-	-	0	-	-	0
f.	1.5	0.09	44	1.7	1.06	4	-	-	0	-	-	0	-	-	0	-	-	0	1.6	0.37	20	1.3	0.86	4	0.3	0.24	4	1.8	0.23	12	-	-	0	-	-	0
g.	1.3	0.05	44	1.0	0.46	4	-	-	0	-	-	0	-	-	0	-	-	0	1.4	0.38	20	2.0	0.66	4	0.3	0.24	4	2.3	0.37	12	-	-	0	-	-	0
h.	2.0	0.04	44	0.7	0.47	3	-	-	0	-	-	0	-	-	0	-	-	0	2.3	0.28	20	3.9	0.14	4	1.2	0.57	5	2.8	0.23	12	-	-	0	-	-	0
i.	0.7	0.04	44	0.0	0.00	4	-	-	0	-	-	0	-	-	0	-	-	0	1.2	0.33	20	1.3	0.66	4	0.5	0.49	4	1.5	0.34	12	-	-	0	-	-	0
j.	0.8	0.05	43	0.5	0.49	4	-	-	0	-	-	0	-	-	0	-	-	0	1.4	0.33	20	0.9	0.56	4	0.0	0.00	3	2.3	0.21	12	-	-	0	-	-	0
k.	2.7	0.07	43	3.2	0.37	4	-	-	0	-	-	0	-	-	0	-	-	0	2.6	0.30	20	2.0	1.14	4	1.3	0.66	3	2.8	0.38	12	-	-	0	-	-	0
l.	0.7	0.05	44	0.0	0.00	4	-	-	0	-	-	0	-	-	0	-	-	0	1.5	0.42	20	1.4	0.83	4	0.3	0.24	4	1.1	0.26	12	-	-	0	-	-	0
m.	0.9	0.05	43	0.2	0.25	4	-	-	0	-	-	0	-	-	0	-	-	0	1.5	0.29	20	1.3	0.86	4	0.3	0.33	3	1.9	0.32	12	-	-	0	-	-	0
n.	1.3	0.06	42	0.7	0.65	4	-	-	0	-	-	0	-	-	0	-	-	0	2.2	0.26	19	1.5	0.85	4	1.0	0.98	3	2.9	0.23	12	-	-	0	-	-	0
o.	1.5	0.06	43	1.3	0.53	4	-	-	0	-	-	0	-	-	0	-	-	0	2.0	0.46	20	1.4	0.85	4	1.3	0.66	3	2.3	0.35	12	-	-	0	-	-	0
p.	1.6	0.05	42	0.2	0.25	4	-	-	0	-	-	0	-	-	0	-	-	0	2.3	0.33	19	3.0	0.68	4	3.3	0.33	3	2.2	0.30	12	-	-	0	-	-	0
q.	1.2	0.04	41	0.0	0.00	4	-	-	0	-	-	0	-	-	0	-	-	0	1.6	0.26	18	2.7	0.66	4	2.3	0.87	3	1.0	0.35	12	-	-	0	-	-	0
r.	1.5	0.06	43	1.5	0.74	4	-	-	0	-	-	0	-	-	0	-	-	0	1.7	0.32	20	1.0	0.66	4	1.0	0.57	3	2.6	0.40	12	-	-	0	-	-	0
s.	1.7	0.07	43	1.0	0.84	4	-	-	0	-	-	0	-	-	0	-	-	0	2.0	0.31	19	2.9	0.57	4	1.5	0.63	4	1.2	0.29	12	-	-	0	-	-	0
t	0.8	0.05	42	0.0	0.00	4	-	-	0	-	-	0	-	-	0	-	-	0	1.4	0.34	19	1.4	0.83	4	1.3	0.87	3	1.1	0.21	12	-	-	0	-	-	0

a. Switch the computer on and shutdown correctly
b. Use computer software for self learning
c. Use an electronic/Internet dictionary/encyclopedia
d. Input Chinese texts
e. Do homework/write reports
f. Create statistical diagrams
g. Create presentation materials
h. Search for information from the Internet
i. Create a webpage/set up a website
j. Produce a multimedia clip/animation
k. Edit an image or typeset
l. Create/use a database
m. Share/discuss in a news group/discussion forum
n. Download information/software from the Internet
o. Distinguish the credibility of Internet information/news
p. Use Internet securely
q. Protect the computer from a virus/hacker attack
r. Deliver documents/information to others
s. Solve problems related to learning
t. Solve problems related to daily life

Table 9.5g: Distribution of students' scores in ITLA Section 2 – Stage 2 (ITLA, Section 2, Q. 1-20)

	Overall			PH			MMH			ModMH			MmodMH			SMH			SD			HI			VI			H			PS			SOS		
	M	SE	N	M	SE	N	M	SE	N	M	SE	N	M	SE	N	M	SE	N	M	SE	N	M	SE	N	M	SE	N	M	SE	N	M	SE	N	M	SE	N
a.	3.3	0.04	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.8	0.56	12	4.0	0.00	5	3.3	0.24	4	4.0	-	3	-	-	0	3.3	0.19	4
b.	2.5	0.04	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	1.8	0.42	12	3.6	0.19	5	0.8	0.47	4	3.9	-	3	-	-	0	2.8	0.19	4
c.	2.2	0.04	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	1.8	0.37	12	2.4	0.60	5	0.8	0.73	4	3.5	-	3	-	-	0	2.5	0.12	4
d.	2.5	0.04	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	1.9	0.38	12	3.4	0.33	5	2.0	0.00	4	3.9	-	3	-	-	0	2.5	0.20	4
e.	2.3	0.05	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	1.8	0.33	12	2.9	0.66	5	1.8	0.62	4	3.3	-	3	-	-	0	2.5	0.20	4
f.	2.3	0.04	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	1.9	0.38	12	2.7	0.62	5	1.5	0.63	4	3.9	-	3	-	-	0	2.3	0.10	4
g.	2.4	0.05	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.2	0.44	12	2.9	0.66	5	0.8	0.47	4	2.9	-	3	-	-	0	2.5	0.20	4
h.	2.6	0.04	27	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.1	0.39	11	3.0	0.56	5	1.8	0.62	4	3.9	-	3	-	-	0	2.8	0.19	4
i.	2.3	0.04	27	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.6	0.33	12	2.6	0.55	5	0.0	0.00	4	2.9	-	3	-	-	0	2.3	0.14	3
j.	2.0	0.06	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.0	0.44	12	2.8	0.58	5	0.0	0.00	4	1.1	-	3	-	-	0	2.0	0.33	4
k.	2.7	0.04	27	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.1	0.42	11	3.4	0.19	5	0.5	0.49	4	3.5	-	3	-	-	0	3.3	0.19	4
l.	1.8	0.05	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	1.8	0.34	12	1.4	0.64	5	0.8	0.47	4	1.6	-	3	-	-	0	2.3	0.30	4
m.	2.0	0.05	26	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	1.8	0.42	11	2.4	0.48	5	0.8	0.47	4	3.4	-	3	-	-	0	2.0	0.23	3
n.	2.4	0.05	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.2	0.34	12	2.5	0.57	5	1.3	0.47	4	3.9	-	3	-	-	0	2.5	0.26	4
o.	2.4	0.05	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.2	0.29	12	2.8	0.54	5	1.8	0.62	4	3.5	-	3	-	-	0	2.3	0.30	4
p.	2.3	0.05	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	1.9	0.45	12	3.4	0.19	5	1.8	0.62	4	3.9	-	3	-	-	0	2.0	0.37	4
q.	2.0	0.05	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.2	0.39	12	2.1	0.70	5	0.8	0.47	4	3.4	-	3	-	-	0	1.5	0.20	4
r.	2.5	0.05	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.6	0.37	12	2.6	0.48	5	1.3	0.73	4	3.9	-	3	-	-	0	2.3	0.30	4
s.	2.0	0.05	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	1.9	0.42	12	2.5	0.57	5	1.0	0.69	4	3.5	-	3	-	-	0	1.5	0.26	4
t.	2.0	0.05	28	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	1.9	0.33	12	2.0	0.64	5	1.3	0.47	4	3.9	-	3	-	-	0	2.0	0.29	4

Table 9.5h: Distribution of students' scores in ITLA Section 2 – Stage 3 (ITLA, Section 2, Q. 1-20)

	Overall			**PH**			**MMH**			**ModMH**			**MmodMH**			**SMH**			**SD**			**HI**			**VI**			**H**			**PS**			**SOS**		
	M	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**
a.	3.6	0.02	83	4.0	0.00	3	-	-	0	-	-	0	-	-	0	-	-	0	2.8	0.08	11	4.0	0.10	13	4.0	-	1	4.0	0.00	3	3.7	0.10	30	3.2	0.12	22
b.	3.0	0.03	83	3.7	0.09	3	-	-	0	-	-	0	-	-	0	-	-	0	2.5	0.08	11	3.5	0.43	13	3.0	-	1	3.1	0.10	3	2.6	0.16	30	2.8	0.09	22
c.	2.4	0.04	82	2.3	0.33	3	-	-	0	-	-	0	-	-	0	-	-	0	2.5	0.08	11	3.3	0.50	13	0.0	-	1	3.0	0.19	3	2.7	0.19	30	2.2	0.09	21
d.	2.9	0.05	83	2.7	0.24	3	-	-	0	-	-	0	-	-	0	-	-	0	2.5	0.08	11	3.9	0.43	13	4.0	-	1	3.9	0.10	3	2.9	0.18	30	2.3	0.30	22
e.	2.7	0.05	83	2.7	0.24	3	-	-	0	-	-	0	-	-	0	-	-	0	2.6	0.08	11	3.8	0.67	13	3.0	-	1	2.9	0.29	3	2.5	0.18	30	2.0	0.17	22
f.	2.5	0.03	83	2.7	0.24	3	-	-	0	-	-	0	-	-	0	-	-	0	2.5	0.08	11	2.6	0.36	13	2.0	-	1	2.7	0.00	3	2.4	0.12	30	2.5	0.16	22
g.	2.7	0.07	83	3.7	0.09	3	-	-	0	-	-	0	-	-	0	-	-	0	2.5	0.08	11	3.3	1.06	13	0.0	-	1	2.9	0.19	3	2.0	0.26	30	2.6	0.30	22
h.	3.0	0.05	80	2.7	0.36	3	-	-	0	-	-	0	-	-	0	-	-	0	2.6	0.08	10	3.8	0.77	13	3.0	-	1	3.0	0.19	3	2.7	0.25	29	3.0	0.06	21
i.	2.0	0.04	83	1.7	0.09	3	-	-	0	-	-	0	-	-	0	-	-	0	2.7	0.07	11	2.4	0.59	13	2.0	-	1	2.7	0.19	3	1.7	0.19	30	2.0	0.12	22
j.	2.0	0.03	83	1.3	0.09	3	-	-	0	-	-	0	-	-	0	-	-	0	2.4	0.08	11	2.4	0.29	13	0.0	-	1	0.1	0.10	3	2.1	0.34	30	2.3	0.10	22
k.	2.6	0.03	83	3.7	0.09	3	-	-	0	-	-	0	-	-	0	-	-	0	2.3	0.08	11	3.2	0.36	13	0.0	-	1	2.9	0.00	3	2.4	0.20	30	2.5	0.11	22
l.	1.6	0.05	83	0.7	0.18	3	-	-	0	-	-	0	-	-	0	-	-	0	2.5	0.07	11	1.6	0.81	13	3.0	-	1	0.1	0.10	3	1.5	0.21	30	1.7	0.16	22
m.	2.1	0.03	82	1.0	0.27	3	-	-	0	-	-	0	-	-	0	-	-	0	2.5	0.08	11	2.1	0.43	13	2.0	-	1	2.7	0.00	3	1.9	0.20	30	2.7	0.08	21
n.	2.6	0.04	83	2.3	0.33	3	-	-	0	-	-	0	-	-	0	-	-	0	2.5	0.08	11	3.3	0.50	13	3.0	-	1	3.1	0.10	3	2.1	0.29	30	2.7	0.08	22
o.	2.2	0.03	82	1.0	0.27	3	-	-	0	-	-	0	-	-	0	-	-	0	2.8	0.08	11	2.4	0.26	13	1.0	-	1	2.9	0.19	3	2.0	0.15	30	2.6	0.10	21
p.	2.6	0.05	79	4.0	0.00	3	-	-	0	-	-	0	-	-	0	-	-	0	2.5	0.08	11	3.4	0.59	13	2.0	-	1	2.9	0.10	3	2.2	0.28	28	1.8	0.25	20
q.	2.0	0.04	83	1.0	0.27	3	-	-	0	-	-	0	-	-	0	-	-	0	2.5	0.08	11	2.6	0.67	13	1.0	-	1	2.9	0.00	3	1.9	0.19	30	2.1	0.08	22
r.	2.7	0.04	83	2.3	0.33	3	-	-	0	-	-	0	-	-	0	-	-	0	2.5	0.08	11	3.7	0.45	13	2.0	-	1	3.7	0.19	3	2.9	0.19	30	2.4	0.14	22
s.	2.2	0.03	83	1.0	0.27	3	-	-	0	-	-	0	-	-	0	-	-	0	2.4	0.08	11	3.2	0.24	13	3.0	-	1	3.0	0.19	3	2.4	0.22	30	2.0	0.07	22
t.	1.9	0.03	83	1.0	0.27	3	-	-	0	-	-	0	-	-	0	-	-	0	2.2	0.08	11	2.1	0.45	13	2.0	-	1	2.6	0.00	3	1.9	0.20	30	2.0	0.07	22

Table 9.5i: Distribution of students' scores in ITLA Section 2 – Stage 4 (ITLA, Section 2, Q. 1-20)

	Overall			PH			MMH			ModMH			MmodMH			SMH			SD			HI			VI			H			PS			SOS		
	M	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**
a.	3.6	0.02	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	3.1	0.44	7	-	-	0	-	-	0	-	-	0	4.0	0.00	3
b.	2.7	0.01	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.6	0.26	7	-	-	0	-	-	0	-	-	0	2.7	0.04	3
c.	2.6	0.03	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.5	0.62	7	-	-	0	-	-	0	-	-	0	2.7	0.11	3
d.	3.4	0.03	8	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	3.2	0.62	5	-	-	0	-	-	0	-	-	0	3.7	0.04	3
e.	2.9	0.04	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	3.2	0.73	7	-	-	0	-	-	0	-	-	0	2.7	0.04	3
f.	2.4	0.03	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.9	0.47	7	-	-	0	-	-	0	-	-	0	2.0	0.07	3
g.	3.1	0.03	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	3.2	0.66	7	-	-	0	-	-	0	-	-	0	3.0	0.00	3
h.	3.8	0.03	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	3.5	0.51	7	-	-	0	-	-	0	-	-	0	4.0	0.00	3
i.	2.7	0.05	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.4	1.03	7	-	-	0	-	-	0	-	-	0	2.7	0.04	3
j.	2.4	0.02	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.0	0.45	7	-	-	0	-	-	0	-	-	0	2.7	0.04	3
k.	2.4	0.02	9	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.9	0.31	7	-	-	0	-	-	0	-	-	0	2.0	0.00	2
l.	2.0	0.04	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.1	0.79	7	-	-	0	-	-	0	-	-	0	2.0	0.07	3
m.	1.9	0.03	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.2	0.43	7	-	-	0	-	-	0	-	-	0	1.7	0.11	3
n.	2.6	0.03	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.5	0.51	7	-	-	0	-	-	0	-	-	0	2.7	0.04	3
o.	2.5	0.02	9	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.4	0.35	7	-	-	0	-	-	0	-	-	0	2.5	0.06	2
p.	2.6	0.03	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.9	0.47	7	-	-	0	-	-	0	-	-	0	2.3	0.08	3
q.	2.6	0.04	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	2.5	0.84	7	-	-	0	-	-	0	-	-	0	2.7	0.04	3
r.	2.8	0.02	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	3.4	0.41	7	-	-	0	-	-	0	-	-	0	2.3	0.08	3
s.	3.0	0.04	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	3.1	0.82	7	-	-	0	-	-	0	-	-	0	3.0	0.00	3
t.	2.1	0.03	10	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	1.8	0.63	7	-	-	0	-	-	0	-	-	0	2.3	0.04	3

Table 9.5j: Heads' perceptions of impacts on students (School Heads' Questionnaire, Q. 8c)

	Overall			PH			MMH			ModMH			MmodMH			SMH			SD			HI			VI			H			PS			SOS		
	M	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**	**M**	**SD**	**N**
a.	3.1	0.6	65	3.0	0	6	3.3	0.5	10	3.4	0.5	13	3.6	0.5	5	2.6	1.0	9	3.1	0.4	7	3.0	0	4	3.0	-	1	3.0	-	1	3.0	0	2	2.9	0.4	7
b.	3.1	0.7	65	3.3	0.5	6	3.4	0.5	10	3.3	0.5	13	3.4	0.5	5	2.1	0.9	9	2.9	0.9	7	3.3	0.5	4	3.0	-	1	3.0	-	1	3.0	1.4	2	3.3	0.5	7
c.	2.9	0.6	65	3.2	0.8	6	3.2	0.6	10	2.6	0.7	13	2.8	0.4	5	2.6	0.7	9	2.9	0.7	7	3.0	0	4	3.0	-	1	3.0	-	1	3.0	0	2	3.1	0.4	7
d.	2.8	0.7	65	3.0	0.6	6	2.9	0.7	10	2.7	0.8	13	2.8	0.4	5	3.2	0.4	9	2.1	0.9	7	3.5	0.6	4	3.0	-	1	3.0	-	1	1.5	0.7	2	2.7	0.5	7
e.	2.5	0.8	65	2.7	0.8	6	2.7	0.7	10	2.4	0.9	13	2.6	0.5	5	2.3	0.5	9	2.3	1.0	7	3.0	0	4	3.0	-	1	3.0	-	1	1.0	1.4	2	2.3	0.8	7
f.	1.6	0.8	65	1.3	0.5	6	1.9	0.7	10	1.8	1.1	13	1.8	0.8	5	1.2	0.7	9	1.7	0.8	7	1.3	1.0	4	1.0	-	1	3.0	-	1	1.5	0.7	2	1.6	0.8	7
g.	1.3	0.8	65	1.5	0.8	6	1.3	0.5	10	1.6	1.2	13	1.4	0.9	5	0.7	0.7	9	1.3	0.8	7	1.3	1.0	4	1.0	-	1	2.0	-	1	1.0	0	2	1.1	0.7	7
h.	3.3	0.5	65	3.2	0.4	6	3.3	0.5	10	3.5	0.5	13	3.4	0.5	5	3.3	0.5	9	3.3	0.5	7	3.3	0.5	4	3.0	-	1	3.0	-	1	3.0	0	2	3.1	0.4	7
i.	3.0	0.6	65	3.2	0.4	6	3.3	0.5	10	3.2	0.7	13	3.2	0.4	5	2.8	0.4	9	2.7	0.8	7	3.3	0.5	4	3.0	-	1	3.0	-	1	2.5	0.7	2	2.7	0.8	7
j.	2.8	0.7	65	2.8	0.8	6	3.0	0.8	10	2.8	0.9	13	2.8	0.4	5	2.7	0.5	9	2.7	0.8	7	3.0	0	4	3.0	-	1	3.0	-	1	2.5	0.7	2	2.7	0.5	7
k.	3.1	0.5	64	3.0	0	6	3.4	0.5	10	3.2	0.7	13	3.0	0	4	3.1	0.3	9	2.9	0.4	7	3.0	0	4	3.0	-	1	3.0	-	1	2.5	0.7	2	2.7	0.5	7
l.	2.4	0.8	65	2.5	1.0	6	2.7	0.7	10	2.2	1.0	13	2.4	0.5	5	2.6	0.7	9	2.3	0.8	7	2.8	0.5	4	2.0	-	1	3.0	-	1	0.5	0.7	2	2.3	0.5	7
m.	2.0	0.9	65	2.3	0.8	6	1.9	0.9	10	2.1	1.0	13	2.0	0.7	5	1.7	1.1	9	2.0	0.8	7	2.0	0.8	4	3.0	-	1	3.0	-	1	2.0	1.4	2	2.3	0.8	7
n.	2.4	0.6	65	2.3	0.8	6	2.5	0.5	10	2.5	0.7	13	2.2	0.4	5	2.2	0.7	9	2.4	0.5	7	2.8	0.5	4	3.0	-	1	3.0	-	1	2.0	0	2	2.3	0.5	7

Impacts
a. Increased subject knowledge
b. Improved computer skills
c. Enhanced creativity
d. Improved communication and expression skills
e. Strengthened co-operation with others
f. Weakened interpersonal skills due to excessive time spent on computers
g. Negligence of school work due to excessive time spent on computers
h. Stimulated interest in learning
i. Increased initiative to learn
j. Increased confidence
k. Improved learning effectiveness
l. Widened perspective through enlarged social circle
m. More opportunity for being exposed to unhealthy information
n. Developed high-level thinking

Table 9.5k: Teachers' perceptions of benefits to students of IT use in the lesson/s with which they felt the most satisfied (Teachers' Questionnaire, Q. 14e)

	Overall			**PH**			**MMH**			**ModMH**			**MmodMH**			**SMH**			**SD**			**HI**			**VI**			**H**			**PS**			**SOS**		
	M	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**
a.	3.2	0.03	622	3.4	0.13	29	3.4	0.06	72	3.2	0.13	48	3.4	0.08	100	2.8	0.13	58	3.3	0.05	41	3.2	0.04	66	3.1	0.00	29	3.2	0.00	68	3.1	0.02	65	3.1	0.05	46
b.	2.4	0.05	617	2.3	0.07	29	2.5	0.09	70	2.3	0.16	48	2.7	0.11	99	2.0	0.27	58	2.5	0.21	40	2.4	0.01	66	2.4	0.00	29	2.3	0.00	68	2.3	0.22	64	2.4	0.06	46
c.	2.3	0.06	617	2.4	0.02	29	2.3	0.11	71	2.0	0.19	48	2.5	0.12	99	1.8	0.25	56	2.6	0.22	40	2.6	0.02	66	2.3	0.00	29	2.1	0.00	68	2.3	0.14	65	2.5	0.15	46
d.	2.4	0.05	619	2.1	0.00	29	2.4	0.09	71	2.1	0.17	48	2.6	0.13	100	2.3	0.22	57	2.7	0.21	41	2.6	0.01	66	2.3	0.00	29	2.3	0.00	68	2.4	0.18	64	2.3	0.12	46
e.	2.7	0.04	618	2.7	0.14	29	2.6	0.16	70	2.6	0.07	48	2.9	0.11	98	2.9	0.19	58	2.6	0.05	41	2.7	0.04	66	2.7	0.00	29	2.6	0.00	68	2.4	0.12	65	2.3	0.23	46
f.	2.5	0.05	617	2.7	0.17	29	2.4	0.07	71	2.4	0.16	48	2.6	0.09	99	2.7	0.24	56	2.4	0.20	40	2.7	0.01	66	2.5	0.00	29	2.4	0.00	68	2.3	0.05	65	2.3	0.28	46
g.	3.2	0.03	624	3.2	0.06	29	3.3	0.04	72	3.3	0.12	49	3.4	0.05	100	3.2	0.12	59	3.1	0.13	41	3.2	0.04	66	3.2	0.00	29	3.2	0.00	68	3.1	0.01	65	3.1	0.07	46
h.	3.0	0.03	620	3.0	0.03	29	3.0	0.06	70	2.9	0.10	48	3.2	0.04	100	2.9	0.13	58	3.0	0.01	41	3.0	0.04	66	2.9	0.00	29	3.1	0.00	68	2.9	0.03	65	2.9	0.08	46
i.	2.7	0.03	616	2.6	0.15	28	2.8	0.05	70	2.5	0.10	48	3.0	0.08	100	2.5	0.16	58	2.8	0.06	39	2.8	0.02	66	2.7	0.00	29	2.9	0.00	68	2.5	0.08	65	2.6	0.08	45
j.	3.0	0.05	617	3.0	0.00	29	3.2	0.05	70	3.0	0.14	48	3.2	0.05	99	2.8	0.30	58	3.0	0.10	40	3.0	0.01	66	3.0	0.00	29	3.0	0.00	68	2.8	0.03	65	2.8	0.11	45
k.	2.1	0.05	614	2.0	0.09	29	2.2	0.17	71	1.9	0.18	48	2.3	0.11	98	2.1	0.22	57	2.1	0.19	39	2.2	0.03	66	2.0	0.00	28	1.9	0.00	68	2.0	0.06	65	1.9	0.19	45
l.	2.6	0.07	619	2.7	0.07	29	2.7	0.13	71	2.3	0.30	49	2.7	0.11	99	2.8	0.16	57	2.7	0.11	40	2.8	0.06	66	2.3	0.00	29	2.3	0.00	68	2.4	0.19	65	2.4	0.32	46
m.	2.8	0.02	620	2.6	0.05	29	3.0	0.10	71	2.9	0.03	49	3.0	0.03	99	2.9	0.16	58	3.0	0.07	40	2.6	0.05	66	2.7	0.00	29	2.8	0.00	68	2.5	0.01	65	2.6	0.13	46
n.	2.9	0.03	621	2.8	0.06	29	3.1	0.07	72	2.9	0.05	49	3.1	0.03	99	2.5	0.16	57	3.0	0.09	41	2.9	0.04	66	2.9	0.00	29	3.0	0.00	68	3.1	0.02	65	2.8	0.05	46
o.	2.4	0.04	616	2.4	0.05	29	2.5	0.19	71	2.3	0.05	47	2.6	0.10	99	2.1	0.12	57	2.6	0.01	39	2.3	0.06	66	2.3	0.00	29	2.2	0.00	68	2.2	0.06	65	2.2	0.16	46

Benefits
a. Increased subject knowledge
b. Improved computer skills
c. Improved information processing ability
d. Enhanced creativity
e. Improved communication and expression skills
f. Learned to co-operate with others
g. Stimulated interest in learning
h. Increased initiative to learn
i. Increased confidence
j. Improved learning effectiveness
k. Enlarged social circle
l. Widened perspective through more interaction with the outside world
m. Greater concentration in learning
n. Easier and deeper understanding of the lesson
o. Clear progress in academic performance

Table 9.5*l*: Students' perceptions of what they have gained from IT use in class (Students' Questionnaire, Q. 13b)

	Overall			**PH**			**MMH**			**ModMH**			**MmodMH**			**SMH**			**SD**			**HI**			**VI**			**H**			**PS**			**SOS**		
	M	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**	**M**	**SE**	**N**
a.	3.0	0.04	229	3.1	0.14	16	2.6	0.14	31	-	-	0	3.3	0.15	19	-	-	0	3.2	0.14	43	3.4	0.18	30	3.0	0.23	12	3.4	0.24	18	2.7	0.14	30	3.2	0.10	30
b.	2.9	0.04	227	2.6	0.17	16	2.7	0.08	31	-	-	0	2.9	0.16	19	-	-	0	2.8	0.23	43	3.4	0.13	29	2.7	0.29	12	2.7	0.22	18	2.8	0.12	30	3.2	0.11	29
c.	2.6	0.05	223	2.3	0.19	16	2.5	0.16	28	-	-	0	2.8	0.17	19	-	-	0	2.8	0.18	43	3.0	0.27	29	2.4	0.26	11	2.2	0.17	18	2.6	0.13	29	2.5	0.14	30
d.	2.7	0.06	224	2.6	0.44	16	2.7	0.11	28	-	-	0	3.1	0.22	19	-	-	0	2.9	0.22	43	2.9	0.21	29	2.3	0.31	12	1.9	0.39	18	2.4	0.14	30	2.5	0.22	29
e.	2.5	0.05	223	2.3	0.18	16	2.4	0.17	28	-	-	0	2.9	0.13	19	-	-	0	2.7	0.29	43	2.7	0.16	29	2.6	0.21	12	1.1	0.51	18	2.3	0.10	30	2.7	0.16	28
f.	2.8	0.05	225	2.6	0.14	16	2.5	0.14	29	-	-	0	3.0	0.20	19	-	-	0	3.0	0.13	42	3.5	0.09	30	2.8	0.26	12	3.1	0.50	18	2.3	0.12	30	3.0	0.10	29
g.	3.0	0.05	221	3.2	0.17	16	2.9	0.13	29	-	-	0	3.0	0.22	18	-	-	0	3.1	0.13	41	3.4	0.13	30	3.1	0.08	12	3.6	0.22	17	2.6	0.16	29	2.9	0.13	29
h.	2.9	0.04	223	3.1	0.08	16	2.7	0.09	29	-	-	0	3.1	0.14	17	-	-	0	2.9	0.14	42	3.3	0.15	30	2.7	0.24	12	3.4	0.24	18	2.4	0.12	30	2.8	0.12	29
i.	2.7	0.05	223	2.6	0.16	16	2.7	0.20	28	-	-	0	2.9	0.11	18	-	-	0	2.8	0.19	43	2.9	0.17	29	2.4	0.31	12	2.8	0.17	18	2.0	0.15	30	2.8	0.11	29
j.	2.6	0.06	220	2.6	0.11	16	2.4	0.13	28	-	-	0	2.8	0.28	17	-	-	0	2.8	0.22	42	3.0	0.14	28	2.7	0.27	12	2.6	0.34	18	2.4	0.14	30	2.7	0.15	29
k.	2.5	0.08	222	2.3	0.31	16	2.4	0.14	28	-	-	0	2.3	0.41	17	-	-	0	2.7	0.25	43	3.0	0.18	30	2.0	0.30	12	3.1	0.37	17	2.2	0.17	30	2.6	0.09	29
l.	2.6	0.06	221	2.6	0.26	16	2.4	0.14	28	-	-	0	2.6	0.21	18	-	-	0	2.7	0.21	43	3.1	0.35	27	2.5	0.27	12	3.0	0.40	18	2.6	0.11	30	2.7	0.20	29

Perceived gain
a. Increased subject knowledge
b. Improved computer skills
c. Improved information processing ability
d. Enhanced creativity
e. Improved communication and expression skills
f. Learned to co-operate with others
g. Stimulated interest in learning
h. Increased initiative to learn
i. Increased confidence
j. Improved learning effectiveness
k. Enlarged social circle
l. Widened perspective through more interaction with the outside world

Chapter 10 Future needs for ITEd in Hong Kong

This chapter will describe the main issues that were identified from the interviews with the various stakeholder groups and open-ended comments from the School Heads', Teachers' and Parents' questionnaires with regard to future directions for ITEd in Hong Kong.

10.1 Obstacles and difficulties in ITEd implementation

The Primary, Secondary and Special School Sector heads all identified similar items as being the main obstacles to the successful implementation of ITEd (Primary and Secondary School Heads' Questionnaire item 18, Special School Heads' Questionnaire item 17, part 1), even though the rankings are slightly different. These were the teachers' workload being so high that they do not have time to adopt IT in teaching (90.5%, 94.3% and 80% of primary, secondary and special heads respectively rating this as a problem), lack of suitable educational software/IT teaching resources (80.7%, 89.3%, 87.5%), teaching quality affected because of the time required for teachers to prepare or attend professional development activities (82.8%, 88.1%, 77.4%) and teachers' lack of knowledge/skills to apply IT to education (81%, 86.2%, 73.9%). Majorities of the school heads rated some of these problems as being of average seriousness to serious (Primary and Secondary School Heads' Questionnaire item 18, Special School Heads' Questionnaire item 17, part 2): teacher workload (Primary and Special), lack of suitable software and resources (all), and time required for preparation affecting teaching quality (Primary). In all other cases majorities in all three sectors rated the obstacles as average to not serious.

Interestingly, despite the amount of money spent on hardware over the past five years, 71% of the primary school heads, 57.7% of the secondary school heads and 57.1% of special school heads saw insufficient computer rooms as an obstacle, with 62.6%, 36.3% and 55.6% respectively seeing it as a serious or very serious problem. 73.1% of primary, 56.4% of secondary and 63.5% of special school heads saw insufficient computers as an obstacle, with 55.6%, 34.2% and 51.3% respectively seeing this as a serious or very serious problem.

IT team members (IT Team Members' Questionnaire, item 4) were also critical of the obstacles created by their own (80.7%, 82%, 85.4%) and other teachers' workloads (84.7%, 87.8%, 74.8%), all rated by majorities as average to serious) and insufficiency of IT resources in their schools (around 80%). As well, despite the fact that so many teachers have undergone skills training, 77.7%, 83% and 76.5% of the Primary, Secondary and Special Schools IT team members respectively believe that teachers in general lack the knowledge and skills to apply IT in their teaching – although this was only seen as an average to serious problem by the Primary and Secondary groups and an average to not very serious problem by the Special Schools group. The problem of insufficient IT resources and software was indicated by 77.6%, 75.1% and 85.7% of the IT team members. While these proportions are quite a bit lower than the proportions of school heads indicating this to be a problem, it is interesting to note that a higher proportion of Special Schools IT team members regarded it as a problem than their Primary and Secondary counterparts.

From the qualitative data the major impediments and obstacles that were identified are summarized below.

Obstacle	Stakeholders who made comment
The focus has been on developing IT resources but may be at the expense of the aims of education – IT cannot replace the teacher.	Special Schools Teachers' open comments Special Schools Heads' open comments Secondary Heads' open comments Secondary Teachers' open comments Primary Teachers' open comments Secondary Parents' open comments Primary Parents' open comments
Teachers show resistance to change.	Education and IT-related Associations interview School Heads' Associations interview ITEd Project Owner interview Policy Maker
Teachers' inability to adapt to changes	Teachers' Associations interview
The pressures of the public-examination system discourage teachers from adopting significant changes in their pedagogical use of IT.	Teachers' Associations interview Trade Associations interview ITEd Project Owner interview Tertiary Institution Representative interview
IT budget is only enough for consumables, not maintenance/expecting schools to raise funds is inappropriate	Primary Heads' open comments Secondary Heads' open comments
School heads are concerned about the physical security of hardware (for example, server location to take into account risk of theft and fire etc) and also about information security (for example, unauthorized access to school information stored in web sever and/or monitoring information students are able to access on Internet)	Primary Heads' open comments Secondary Heads' open comments
There is a perception that the EMB guideline to incorporate IT into 25% of the curriculum is unrealistic.	Special School Heads' open comments Secondary Heads' open comments Secondary Teachers' open comments Primary Teachers' open comments
Location of computers in computer laboratories rather than general classrooms may not be conducive to pedagogical integration of IT.	Tertiary Institution Representative interview ITEd Project Owner interview

In their questionnaire open comments, a number of teachers and school heads from all three sectors commented that one of the obstacles to successful IT implementation is the perception that the focus on the development of IT resources might be at the expense of the aims of education. They stated that IT cannot replace the teacher:

> *Implementation issues relating to prioritising hardware before software which has led to undue emphasis on computers but relatively little on raising teacher enablement (Primary School Head, interview).*
>
> *Technology does not teach students, effective teachers do. The pedagogical effectiveness enhanced in class practice is the essence of IT in Education (Secondary School Head, open comments).*

Other obstacles from the school heads' point of view were the security issue and the need for sufficient funding to maintain and upgrade hardware and consumables. There was also some comment from some of the school heads about the target to use IT in 25% of the curriculum, which they described as being unrealistic.

From the perspective of some of the stakeholders including ITEd Project Owners, Policy Makers and some of the professional associations, one of the biggest impediments is teachers' resistance to change. Interestingly, the Teachers' Associations representatives gave a different view of this issue, saying that most teachers are open to change but unable to adapt due to pressures that include time, workload, curriculum and lack of understanding about how to do it effectively.

Another issue that was mentioned by several stakeholders was that of the pressure of the current examination-driven system. These stakeholders were of the opinion that significant pedagogical change cannot happen unless the system is changed first.

10.2 Views on future improvement of ITEd

Teachers Views

Teachers' Questionnaire item 20 asked respondents to indicate their agreement about future development of ITEd. More than 85% of the primary teachers agreed or strongly agreed on all items, including: increase allowance/funding for schools (85.3%), increase human resources (88.8%), continue to provide different kinds of training and professional development for teachers (86.8%), increase the provision of IT resources for teaching (89.5%) and reduce teacher workload to allow them more time for development in IT in education (89.4%). Again in the secondary sector, high proportions of teachers agreed or strongly agreed with all of the suggested future developments. The most popular was reduction of teachers' workloads to enable them to have more time to develop their use of IT in education (87.5% rating agreeing or strongly agreeing to this). This was followed by increased provision of IT teaching resources (84.1%), increased human resources in schools (82.9%) and continued provision for different kinds of IT-related professional development (80.2%). For the Special School Sector the highest proportion of teachers indicated agreement or strong agreement with the need to increase the provision of IT teaching resources (91.4%). It is important to note that this is a considerably higher percentage than for either of the Primary or Secondary sectors, indicating that special schools have different, specialized needs for resources that cater for the varied needs of their students. This was followed by increasing human resources in school (88.3%), and reducing the teachers' workload to enable them to spend more time developing their use of IT (86.7%).

Issues identified in interviews and questionnaire open comments

1. Policy and sustainability

Issue	Stakeholders who made comment
There is a need for clear goals and objectives for the pedagogical integration of ITEd.	Special Schools Teachers' open comments Special Schools Heads' open comments Secondary Heads' open comments Secondary Teachers' open comments Primary Teachers' open comments
There is a need for continued commitment to ITEd initiatives.	Education and IT-related Association interviews Primary Heads open comments Secondary Heads open comments
IT specialist and technician positions need to be maintained/increased to enable ongoing support for teachers.	Special Schools Heads' open comments Secondary Heads' open comments Primary Heads' open comments Special Schools Teachers' open comments Secondary Teachers' open comments Primary Teachers' open comments

With respect to policy matters, one of the recommendations was that the Government should continue with the momentum of the ITEd initiative so that the efforts of the past five years do not go to waste:

> *It is hoped that the Government will continue its financial and technical support for school IT development. After 5 years of IT facilities/equipment being set up in schools, many of these facilities/equipment need upgrading/replacement. Maintenance costs are another big issue. If schools do not have financial backup for maintenance or replacement much effort spent on developing IT facilities/equipment in the past 5 years will be wasted (Secondary Head, open comment)*
>
> *The Government needs to continue funding for the development of IT in Education, for example install a projector in every classroom and provide support to schools. They can help teachers to construct 'interactive teaching material' to implement actual pedagogical change (not presentation only material, such as PowerPoint). This can enhance teachers to use IT to assist their teaching. Otherwise the Five-Year Strategy will become useless. (Primary Head, open comment)*

The other matter that was raised in open comments by the school heads and teachers from all three sectors was the importance of maintaining or increasing the IT specialist and technician positions to enable teachers to receive ongoing support, not only with technical problems but with identifying and evaluating appropriate teaching materials.

2. Resources

Issue	Stakeholders who made comment
More hardware and peripherals and ongoing regular renewal of these are needed, for use by students and teachers	Special Schools Teachers' open comments Special Schools Heads' open comments Primary Heads' open comments Education and IT-Related Associations interview School Heads Association interview Teachers' Associations interview
Continue the momentum of the past 5 years so it is not wasted.	Secondary Heads' open comments
Central support for selecting and evaluating IT resources, and collective licensing of common educational software for schools is suggested.	Special Schools Teachers' open comments Special Schools Heads' open comments Secondary Heads' open comments Primary Heads' open comments Education and IT-Related Associations interview Teachers' Associations interview School Heads' Associations interview ITEd Project Owner interview Policy Maker interview
There is a need for software developers to make available a wider range of educational software at low cost.	Teachers' Associations interview
Develop web-based learning accessible to students and more on-line resources that teachers and/or students can access.	Primary Heads' open comments Secondary Teachers' open comments Primary Teachers' open comments
There has been some suggestion that it may be better to allocate a one-line budget to enable schools to allocate expenditure according to priority and need, rather than a budget that is earmarked for specific purposes.	Special Schools Heads' open comments Secondary Heads' open comments Primary Heads' open comments School Heads Association interview ITEd Project Owner interview Policy Maker interview
Put more emphasis on using the community, outside the school system, to develop potential and individual talents of youth	NGOs with Parent Education interview

Issue	Stakeholders who made comment
Give/sell old computers to students in need and/or EMB subsidise students to buy computers.	Secondary Heads' open comments Primary Heads' open comments Secondary Parents' open comments
Promote partnerships with publishers to develop appropriate software suitable for the local context.	Secondary Heads' open comments Primary Heads' open comments
Seek help from commercial and other sectors (note that one ITEd Project Owner commented that the potential for this is diminishing with the economic downturn)	Special School Heads' open comments Policy Maker interview Trade Associations interview ITEd Project Owner interview

With respect to resources, ongoing maintenance and upgrading of hardware and peripherals was seen as a major issue. It was also suggested that there may be a need to look beyond the Government for support for this purpose:

> *There is potential to develop commercial project sponsorship at primary and school levels to promote IT development. However, this should be a three-way interactive process between the* Government, *school and business sectors and should be initiated by the Government (Trade Associations).*
>
> *Parents are very important especially in this time of budget constraints in Hong Kong – we need to talk to parents and the IT industry and form partnerships between them. It is very expensive. In future there will not be so much money available. Now we are looking to QEF to finance ITEd initiatives (Policy Maker).*

The idea of providing central support for selecting and evaluating IT resources, particularly software, rather than leaving this to be done on a school-by-school basis, was a popular suggestion with several of the stakeholder groups:

> *Due to heavy workloads, teachers cannot use IT all the time. It wastes time making teaching materials. If the Government would provide suitable resources, such as designing teaching material or online learning platforms, this could reduce our pressure (Primary Teacher, open comments)*

3. Pedagogy and teacher professional development

Issue	Stakeholders who made comment
Increase and encourage school-based professional development	Special School Teachers' open comments Project owner
Increase and encourage sharing within and between schools/showcase exemplary schools	Primary Heads' open comments Secondary Heads' open comments Special School Heads' open comments ITEd Project Owner interview Tertiary Representative interview School Heads' Associations interview Teachers' Associations interview
Reduce teachers' workloads to allow time to learn/prepare for IT use.	Primary Heads' open comments Secondary Heads' open comments Special School Heads' open comments Secondary Teachers' open comments Primary Teachers' open comments Special School Teachers' open comments ITEd Project Owner interview

Issue	Stakeholders who made comment
Provide incentives and encouragement for teachers who use IT well.	Secondary Heads' open comments Special School Heads' open comments Special School Teachers' open comments
Focus on how to use software, not how to develop it/effective application of IT to facilitate students' learning	Secondary Teachers' open comments Primary Teachers' open comments Education and IT-related Associations interview Teachers' Associations interview ITEd Project Owner interview Tertiary Institution Representative interview

Some of the ITEd project owners commented on the need to change the mindsets of school heads and teachers:

> *The top priority needs to be professional training for teachers- this needs to be reviewed because most of the training courses now are not effective – 2-3 day training is not effective – we need to form quality circles within schools and change mind-sets and practices in classrooms (ITEd Project Owner).*

> *School heads are not ready to be accountable under school-based management – some are not ready to make decisions themselves to plan for IT use. We need to change the mindsets of both school heads and teachers – not regarding the hardware and technology but regarding their attitude towards education (ITEd project owner).*

One of the future recommendations seen as important for teacher professional development is the establishment of a sharing culture to enable within school and between school sharing of resources and best practices:

> *Many teachers still need concrete examples – now there are not sufficient examples (ITEd Project Owner).*

> *Professional dialogues and dialogues about practice…. then able to slowly share and change...also need to change the model of professional development...we are currently using a deficit model (you are inadequate in some way so need to be taught) – this can get people to learn new techniques or skills but is not adequate to change practice...If you want to promote change you cannot work at the individual level, you have to work at an institutional level – Hong Kong needs to learn from our own and other people's mistakes and use the professional development as an input to support the establishment of professional conversation, professional community practice and to promote the establishment within schools or communities of practice...action research/workplace development (Tertiary Institution Representative).*

> *Recently in our school a new intranet system, e-Class, was set up to further enhance the use of IT in teaching and learning in line with the curriculum reform. This is also one of the major concerns of our School Development Plans for 2003-2004. Training for teachers is provided by our Instructional Support Committee in school besides courses offered by EMB/other institutions. Enthusiastic junior teachers who excel in IT can lead and guide all staff in the use of IT. Senior teachers who are experienced in curriculum matters can collaborate with the committee in producing software etc. for teaching and learning. The project is progressing successfully (Secondary Head, open comment).*

> *Due to the limitation of resources, sharing resources is the future strategy. Therefore, schools have to develop their relationships with other schools or organisations to develop a sharing culture. Schools also have to co-operate with the commercial sector to seek more funding (Primary Head, open comment).*

Establish a "joint school IT club". This club can promote exemplary schools to other schools, teachers can apply the practices of the exemplary schools in their own schools after getting the information from the club. Provide more support to schools for school-based training. This training must be tailor-made to meet the individual needs of different teachers (Primary Head, open comment).

4. Student learning

Issue	**Stakeholders who made comment**
Improve assessment criteria and provide better guidelines for effective application of IT	School Heads Associations interview Teachers' Associations interview
Change the assessment system to place more emphasis on learning effectiveness than examination results	Teachers' Associations interview Tertiary Institution Representative interview
Evaluate the impacts of IT on students' learning and help teachers to understand how to use IT to improve this	ITEd Project Owner interview

Not very many of the stakeholder groups made future recommendations regarding student learning outcomes. For those that did, however, the emphasis was on the need to have a stronger focus on establishing what is actually meant by effective student learning outcomes and strategies for assessing them. One ITEd project owner made the following comment about the importance of schools taking responsibility for expecting students to use IT as part of their schoolwork:

Schools need to make more demands on students to use computers at school and at home as part of their schoolwork (ITEd project owner).

5. Research

Focus/suggestion	**Stakeholders who made comment**
Encourage teachers to participate in school-based action research to develop IT use.	Tertiary Representative interview
Conduct and disseminate research about effective use of IT for different subjects and stages.	ITEd Project Owner interview Policy Maker interview
Use research outcomes as a basis for informing practice.	Tertiary Institution Representative interview
Explore the relationship between IT and the unique needs of special school students, such as how it can enhance their language development.	Special Schools Teachers' open comment

Those involved in research, mainly the tertiary institution representatives, had some particular comments about how important it is to engage in future research to inform decision making and provide examples of good practice for teachers:

We need to promote the IT culture, we need to show them some good examples. This is what I mean by research, if you know more about how IT can be used in teaching and learning, they will be persuaded that IT will be good for their students and they will use it more frequently...Research includes finding good examples, good practices (Tertiary Institution Representative).

In particular, it was recommended that action research approaches should be adopted:

Get schools to help themselves to do their own action research about which kinds of classes are using computers for which purposes – give them a common framework but get them to do it (Policy Maker).

> *...everyone should take on more seriously the kind of research orientation – research in action reflecting on action and research on change (Tertiary Institution Representative).*

6. Parents and community

Comment	**Stakeholders who made comment**
The Government needs to put more effort into promoting the use of IT in the community	Education and IT-related Associations interview
Consult parents in the process of educational reform.	Trade Associations interview
Help parents who are laymen to understand how IT can be used by their children.	Secondary Parents' open comments Primary Parents' open comments

There were three main themes that emerged in relation to parents and the community. One is the need for continued and sustained effort by the Government to promote the use of IT in the community. Another is the importance of consulting parents in the process of educational reform, and the third is the need to help to promote parents' understanding of how IT can be used by their children.

Chapter 11 Summary and Discussion

This chapter presents a general overview of the patterns and trends relating to the six sets of research questions that emerged from the data for all school sectors presented in Chapters 6 to 9. Where appropriate, some comparisons have been made to international literature. This chapter begins with a brief summary of the major findings of this Study followed by an overview of the links between Hong Kong's ITEd achievements and those of some other countries. It then discusses the major research findings with respect to each of the research question sets and, where appropriate, compares these findings to international research findings where such comparable findings are available.

11.1 Summary of major findings

This section presents a summary of the key results of the Overall Study for the Primary, Secondary and Special School Sectors. Obviously, in a study of this magnitude, it is not feasible to summarise every table presented in the body of this report. Consequently, this section only reports the key finding that are related to the main conclusions to be drawn from the Study. It should be noted that the figures presented here are for descriptive purposes and are not intended for the purpose of making comparisons across sectors. Where comparable figures were available in the Preliminary Study (2001), these have been included in square brackets. However, again it must be noted that these figures can only be used as rough indicators and not for the purpose of making rigorous statistical comparisons.

11.1.1 Access, connectivity and usage

Computers in schools

Table 11.1 shows the average numbers of computers in schools across the three sectors. It can be seen that in all cases these figures exceed those of the Preliminary Study.

Table 11.1: Average numbers of computers in schools

School Sector	Average number of computers
Primary	89.8 [64.3]
Secondary	237.0 [169.1]
Special	71.0 [60.6]

Table 11.2 shows the average student-computer ratios for the three school sectors. Again it can be seen that there has been a consistent improvement across all sectors since the Preliminary Study.

Table 11.2: Average student-to-computer ratios

School Sector	Average ratio (gross)	Average ratio (net*)
Primary	7.4 [13.4]	10.0
Secondary	4.6 [7.5]	8.0
Special	2.0 [3.0]	3.5

* Excluding computers in staff rooms and general office

Locations

In all sectors, the computers were located mainly in computer rooms/MMLC/ITLC. Table 11.3 shows the average total numbers of computers in general classrooms. This refers to the total number located in all general classrooms within a school. These numbers have increased since the Preliminary Study, particularly in the Primary and Secondary Sectors, but are still not large. However, it must be noted that, in addition to computers located permanently in general classrooms, it was observed during School Visits that there were other ways in which schools provided access in classrooms, such as using portable equipment on a trolley or notebook computers.

Table 11.3: Average total numbers of computers in general classrooms

School Sector	Average number of computers per school
Primary	11.8 [6.3]
Secondary	10.5 [3.0]
Special	8.0 [7.1]

Connectivity at school

100% school connectivity has been achieved. Table 11.4 shows the percentage of schools with Broadband Internet connection. The percentages are high for all sectors. Again the figures suggest an increase since the Preliminary Study for all sectors.

Table 11.4: Percentage of schools with Broadband Internet connection

School Sector	% of schools
Primary	95.8 [77.3]
Secondary	97.6 [87.1]
Special	93.9

Table 11.5 shows the percentages of schools with school websites and subject/teaching websites. The percentages of schools with websites are high for all sectors and have increased since the Preliminary Study, particularly in the Primary School Sector. Clearly more of the secondary schools have subject teaching websites, although the percentages have increased in both Primary and Secondary Sectors since the Preliminary Study.

Table 11.5: Percentages of schools with school websites and subject/teaching websites

School Sector	% with school websites	% with subject/teaching websites
Primary	97.2 [80]	52.1 [20-30]
Secondary	99.7 [98]	88.4 [50]
Special	95.5	45.5

As can be seen from Table 11.6, Hong Kong compares favourably with other countries as regards targets and achievements in terms of student-to-computer ratio and connectivity in schools.

Table 11.6: International comparisons

Domain	Hong Kong	International achievements/targets
Student-computer ratio	Primary: 7.4 Secondary: 4.6 Special: 2.0	Singapore: target 2 (2002 plan) Korea: target 5 (2005) Japan: target 5.4 (2005) UK: target primary 8; secondary 5 (2005) USA: primary 8; secondary 5 (2000) Thailand: target primary 80; secondary 40 (2005) Australia (Victoria only): 4 (2002) Canada: target 5
Connectivity	100% school connected but not 100% classroom connected	Singapore & Taiwan: 100% schools Thailand: target 100% sec schools (2002) and 100% primary schools (2004) Japan: target 100% classrooms (2005)

Budget expenditure on IT

Table 11.7 shows the range, across all school sectors, of school IT budget expenditure for different items. It can be seen that most budget expenditure was on hardware and consumables, with relatively less on technical support and software and little on staff development. It should be noted, however, that this refers only to IT budgets within schools and does not take into account other sources of funding and provisions available for items such as staff development.

Table 11.7: Percentages of school IT budget expenditure

Budget item	% of IT budget expenditure		
	Primary	Secondary	Special
Hardware	46.2	45.7	46.7
Consumables	22.7	21.7	30.7
Technical support	11.6	12.4	6.1
Software	9.4	11.5	11.5
Staff development	2.7	2.6	2.3

Access and connectivity at home

Table 11.8 shows the range, across all sectors, of home computer ownership and connectivity for the main stakeholder groups. It can be seen that the figures are high for all groups, although relatively lower for special school students.

Table 11.8: Range of home computer ownership and connectivity

Stakeholder group		Home ownership of computers %	Home connectivity % of stakeholders with home computers
School heads, teachers, specialists and therapists		97.1 – 98.9	93.4 – 96.7
Students	Primary	84.4 – 93.0	79.0 – 90.2
	Secondary	97.8 – 99.5	95.4 – 97.5
	Special	77.5	80.4

Usage reported by school

Across all three school sectors, IT was reported to be used most commonly for school administration and teaching and learning (Table 11.9). It was reported to be used much less commonly for communication with parents.

Table 11.9: Reported use of IT for various purposes.

Activity	**% having used IT for activity**		
	Primary	**Secondary**	**Special**
School administration	99.2	99.7	100.0
Teaching and learning	99.7	99.5	100.0
School library	77.0	98.9	76.6
Communication with staff	84.1	97.3	97.0
Communication with students	80.6	95.8	70.8
Communication with parents	67.3	64.6	53.0

School heads' usage

Almost all school heads in all sectors indicated that they made at least some use of computers at school, mainly for administration and analyzing school data, but much less for communicating with students or parents. Almost all school heads in all three sectors reported that they did make some use of computers at home, mostly for job-related tasks and very few for entertainment or dealing with personal matters. Table 11.10 shows the extent of use of computers by school heads in school and at home. Only less than 4% of school heads reported not using computers in school and only 6% or less at home. Around 70% or more of school heads used computers for more than one hour in school whereas above 50% used it for more than one hour at home.

Table 11.10: Use of IT by school heads per day

School Sector		**% reported some use**	**% used it > 1 hr**
Primary	School	97.9	69.6
	Home	96.7	51.3
Secondary	School	98.6	75.4
	Home	94.0	50.2
Special	School	96.9	84.8
	Home	98.4	65.5

Teachers' usage

Almost all teachers in all sectors indicated that they did make some use of computers at school, mostly for teaching, administration and searching information, moderate use for communication, but little use for research. Similarly, almost all teachers reported making some use of computers at home, mostly for job-related tasks, communication and searching information, and very few for entertainment or dealing with personal matters. Table 11.11 shows the extent of use of computers by teachers in school and at home. Again, only less than 4% of teachers reported not using computers in school and only less than 3% at home. The majority used it for more than one hour per day both in school and at home.

Table 11.11: Use of IT by teachers per day

School Sector		% reported some use	% used it > 1 hr
Primary	School	96.3	52.9
	Home	97.2	67.6
Secondary	School	98.8	70.2
	Home	97.3	66.0
Special	School	99.7	89.2
	Home	97.3	79.0

Students' usage

In the Primary School Sector, home IT use was reported as being much greater than IT use at school (Table 11.12). School use consisted of searching information, learning computer skills and project work. Home use was mainly for the purposes of entertainment and information searching, some use for learning and communication.

Table 11.12: Use of IT by primary students per day

Primary		% reported some use	% used it > 1 hr
P3	School	78.7	22.2
	Home	93.0	45.9
P6	School	85.1	22.8
	Home	95.9	71.9

In the Secondary School Sector home IT use again was much greater than IT use at school (Table 11.13) and there was evidence of a trend for decreasing use at school for S4 and S6 students. School use was mainly for searching information, project work and learning computer skills. Home use was mainly for entertainment, searching information and communication, with some use for learning.

Table 11.13: Use of IT by secondary students per day

Secondary		% reported some use	% used it > 1 hr
S2	School	70.2	17.7
	Home	97.5	83.2
S4	School	49.6	12.1
	Home	98.3	87.1
S6	School	61.4	11.1
	Home	98.5	82.1

In the Special School Sector, the percentage of students reporting some use of IT at home is smaller than the percentage reporting some use in school, although a larger proportion reported using it for more than one hour per day at home (Table 11.14). School use was mainly for searching information, learning computer skills and drilling exercises. Home use was mainly reported as being for entertainment and searching information, and some use for participating in other school/learning related activities and communication. Reported barriers to home access were lack of suitable access to necessary assistive device and lack of home availability of special educational software.

Table 11.14: Use of IT by special students per day

Special	% reported some use	% used it > 1 hr
School	89.4	30.4
Home	87.2	45.2

11.1.2 Teacher enablement

All of the teachers who responded to this item reported having been trained in IT use with more than 89% reaching intermediate level or above. However, 15.7%-28.2% of teachers still considered themselves non-users/novice/beginner in applying IT. These figures are summarised in Tables 11.15 and 11.16.

Table 11.15: Highest level of IT competence attained by teachers (Cumulative %)

Highest Level attained	Primary	Secondary	Special
AIT	7.0	4.6	8.1
UIT	45.9	36.4	44.9
IIT	89.2	89.3	92.2
BIT	100.0	100.0	100.0

Table 11.16: Self ratings on stages of adopting IT by teachers

Stages	Primary	Secondary	Special
Creative (can use it effectively for teaching/administration and integrate into work in creative way)	9.3	10.3	15.5
Competent (able to apply appropriately to conduct/assist teaching)	38.2	38.8	51.1
Comfortable/confident (comfortable and confident in using it for certain tasks)	24.3	24.5	17.7
Beginner (beginning to understand procedures and able to use for certain tasks)	20.7	20.2	14.3
Novice (learning the basic skills but basically not confident and often encounter difficulties)	5.0	4.5	1.2
Non-user (aware of availability but rarely/never use it)	2.5	1.7	0.2

Teachers' self assessed competence

The majority of teachers reported themselves to be basically proficient or above in the use of word processing software, communication software, Internet skills and presentation software (Table 11.17). However the percentage of teachers claiming basically proficiency or above in applying/integrating IT into their subject curricula is smaller (Table 11.18), suggesting that there is still a need for staff development particularly in developing teachers' competence in pedagogical use of IT in subject teaching.

Table 11.17 Teachers' self-assessed IT competence in software applications

Application	% rating basically/highly proficient		
	Primary	Secondary	Special
Word processing software	91.1	93.3	96.7
Internet skills	80.3	80.5	88.6
Communication software	71.1	71.4	76.6
Presentation software	71.1	69.8	79.5

Table 11.18: Percentages of teachers rating selves as basically proficient or above in applying/ integrating IT into their subject curricula

School Sector	% of teachers
Primary	60.0
Secondary	54.1
Special	68.7

Motivators

The major motivators for learning IT reported by teachers were for improving teaching, quest for knowledge, acquiring a basic life skill and applying it in their teaching (Table 11.19). The major motivators for applying IT in their teaching were as a result of their own maturity in IT literacy, because of the trend in education, and because of school heads' request/expectation (Table 11.20). Students' accomplishment including enhancing quality of learning was not a strong factor except for teachers/therapists/specialists in special schools.

Table 11.19: Major motivators for teachers to learn IT

Motivator	**% teachers reporting choosing the motivator**		
	Primary	**Secondary**	**Special**
Improve teaching	79.7	78.1	85.8
Acquire a basic life skill	69.9	59.7	74.6
Quest for knowledge	66.7	62.7	68.5
Apply IT in teaching	67.6	60.2	71.2

Table 11.20: Major motivators for teachers to apply IT

Motivator	**% teachers reporting choosing the motivator**		
	Primary	**Secondary**	**Special**
Own maturity in IT literacy	66.4	62.7	76.5
Trend in education	61.7	48.2	66.1
School expectation	56.9	47.4	51.6
Students' accomplishment (including enhancing quality of learning)	41.3	39.5	49.5

Perceived impact on teachers

The major impacts of IT perceived by teachers were enhanced teaching effectiveness and increased awareness of local/Chinese/world affairs (Table 11.21). However, a significant percentage of teachers agreed that they felt exhausted because of information overload and had less time for class preparation/contact with students because of the time they needed to spend preparing to use IT.

Table 11.21: Major impacts of IT perceived by teachers

Impact	**% rating agree/strongly agree**		
	Primary	**Secondary**	**Special**
Enhanced teaching effectiveness	77.1	67.6	83.0
Increased awareness of outside world	58.8	51.4	63.7
Less time for class preparation	45.4	51.3	44.5
Less time for student contact	35.9	43.9	33.0
Exhausted because of information overload	36.7	38.7	30.9

11.1.3 Curriculum, pedagogy and resources

There was some inconsistency between teachers' espoused beliefs and reports of their role in teaching. For example, 81.7%, 77.6% and 87.3% of primary, secondary and special school teachers respectively said they should place high priority on enhancing teaching effectiveness and 84.4%, 75.8% and 75.2% respectively said they should use IT to provide students with more opportunities for self learning. However, when it came to their actual uses of IT in their teaching they indicated their main roles as being to transmit knowledge (92.4%, 93% and 93% respectively), provide learning materials and activities to enable students' understanding of subject content (87.9%, 84.3%, 88.2%) and teaching new knowledge (87.7%, 85.4%, 86%). Only 58.6%, 55.6% and 46.1% emphasised student involvement in problem solving and information searching.

Obstacles to applying IT in teaching

The main obstacles to applying IT in teaching (Table 11.22) were reported to be heavy workload, time required for preparation, lack of suitable educational software or resources, teachers lacking knowledge and skills to apply IT in their curricula, existing curricula not being conducive to ITEd and insufficient computers or IT facilities. For special schools another obstacle was reported to be lack of assistive devices to help students use IT.

Table 11.22: Teachers' perceived obstacles to applying IT in teaching

Obstacle	**% teachers reporting having encountered the problem**		
	Primary	**Secondary**	**Special**
Heavy workload	87.3	85.3	81.0
Time required for preparing IT materials detracted from teaching	76.8	77.9	75.3
Lack of suitable educational software or resources	66.9	69.9	72.2
Teachers lacking knowledge and skills to apply IT in subject curricula	66.2	65.4	63.8
Insufficient computers	60.2	48.6	62.3
Existing training not matching needs	59.9	58.5	55.2

Teachers' beliefs about objectives of IT in education

The beliefs most commonly espoused by teachers include that IT can enhance teaching effectiveness, provide students with opportunities for self learning, assist the development of gifted students (secondary) and assist students with learning difficulties or special educational needs (secondary and special) (Table 11.23).

Relatively lower priority was given to the belief that it can enhance communication with other teachers, students or parents. Most school heads and teachers interviewed saw ITEd mainly as a way to make the lesson 'more interesting' to students.

Table 11.23: Teachers' beliefs about objectives of ITEd

Belief	% rating agree/strongly agree		
	Primary	Secondary	Special
Enhance teaching effectiveness	81.7	77.6	87.3
Provide students opportunities for self learning	84.4	75.8	75.2
Realise effects only achievable via use of IT	64.5	60.1	61.1
Assist students with special educational needs	62.6	49.1	81.1

Teachers' roles in lessons with IT

There was clear evidence of increasing use of IT by teachers, particularly in searching for information and preparing notes or course materials. However use of IT in school is mostly teacher-centred rather than student-centred. For example, Table 11.24 shows the teachers' perceptions of their roles in the lessons using IT with which they were the most satisfied, which suggest more emphasis on the teacher transmitting knowledge and less on the students engaging in problem solving, information seeking or creative activities. There has been little change when compared to findings of the Preliminary Study.

Table 11.24: Teachers' perceptions of their roles during lessons using IT with which they were the most satisfied

Role	% rating agree/strongly agree		
	Primary	Secondary	Special
Transmit correct knowledge	92.4	93.0	93.0
Teach new knowledge	87.7	85.4	86.0
Small group problem analysis/ information searching etc.	58.6	55.6	46.1
Learn through creative activities	61.7	57.0	56.4

Curriculum integration

In the Primary School Sector, with the exception of Physical Education, from 82.4% (on Art) to 97.6% (on English) of school heads reported using IT in KLAs occasionally or always. Similarly, in the Secondary School Sector the range reported by school heads, again with the exception of Physical Education, was from 91.8% (on Chinese) to 98.7% (on Science). Students, however, reported a much lower use across KLAs, except for computer studies. There is clear evidence of increasing use of IT by teachers, particularly for searching for information and preparing notes/course materials for teaching purposes. There is also evidence of increasing use of IT in teaching and learning across KLAs since the Preliminary Study.

Use by teachers in teaching-related activities

Table 11.25 shows the nature of use of computers by teachers in the three school sectors. The most common uses are for preparing notes/course materials, searching for information and, to a lesser extent designing activities and assignments. The less common is carrying out collaborative projects with other schools.

Table 11.25: Nature of use of computers by teachers

Nature of use	% rating always/occasionally		
	Primary	Secondary	Special
Prepare notes/course materials	81.2	94.2	95.6
Search for information	86.9	91.1	96.0
Design activities and assignments	71.1	69.0	88.4
Manage, administer and collect tests	43.0	50.4	45.2
Discuss/communicate with students	38.6	43.7	33.9
Discuss with other teachers	35.6	32.0	49.7
Carry out collaborative projects with other schools	30.2	24.4	35.1

Activities in most satisfactory lesson with IT

As can be seen from Table 11.26, in the lessons using IT with which the teachers were the most satisfied, the majority in all three sectors tended to use the computer as a basis for the teacher explaining and demonstrating to the whole class rather than facilitating students to work with computers either individually or in groups.

Table 11.26: Teachers' activities in lessons using IT with which they were the most satisfied

Purpose	% rating all/most/half of the time		
	Primary	Secondary	Special
Teacher explaining and demonstrating to whole class	73.1	71.0	68.0
Students working individually with computers	39.0	34.4	39.0
Students working in groups with computers	20.7	20.0	20.2

Teachers' pedagogical use in the classroom

- Much of the IT-related activity that was observed was teacher-centred, in the sense that the teachers controlled the directions and flow of the lesson. Often the teachers used the computer as a tool for presentation. In some cases the teachers did this competently, but this was not always the case. Some teachers made use of animation and video for illustration to aid students' understanding.
- Relatively fewer teachers made use of IT in teaching that required students to learn through interacting with the teacher, materials, or peers, or construct their own knowledge.
- Students' motivation and interest is not necessarily a direct consequence of the IT use but rather comes from carefully designed teaching and learning activities that require students to interact with materials, media, teachers or peers.
- The successful use of IT to facilitate teaching and learning across the curriculum is not necessarily related to either the extent or the nature of its use, but rather to the appropriateness and effectiveness of the pedagogical design and execution.
- There is still little evidence that teachers are taking a constructivist approach in terms of using IT to encourage students to construct knowledge based on discussion and collaborative activity.

What really motivates students?

From the classroom visits and interviews with students it was found that:
- the use of IT alone is not a guarantee of interest.
- an IT-supported presentation can be boring, especially if it is text-based.

- teachers' pedagogical skills are important.
- good use of media helps to motivate.
- real motivation and interest come from carefully designed interaction with teachers, peers and materials, appropriately supported by IT

What teachers encouraged/requested students to do with IT

Table 11.27 shows the activities that teachers reported having encouraged/requested their students to do with IT. It can be seen that the patterns are mostly similar for the Primary and Secondary School Sectors. The most commonly reported activities are for reading announcements on school website, downloading learning materials and self learning. The least common are checking grades/feedback from teachers and participating in forums/discussions. It is encouraging to see that a large proportion of teachers encouraged/requested their students to use IT to collaborate with others (e.g. projects), to tackle problems in daily life and to engage in creative tasks.

Table 11.27: Activities that teachers reported having encouraged/requested their students to do with IT

Purpose	**% rating always/occasionally**		
	Primary	**Secondary**	**Special**
Read announcement on school website	74.3	72.5	51.3
Download learning materials	56.6	66.3	38.7
Upload homework/assignments	32.9	41.5	20.3
Online tests or exams	42.7	31.4	11.3
Checking grades/feedback from teachers	21.1	24.4	12.6
Participated in forums/discussions	27.4	33.8	21.4
Communicating with others	49.4	49.0	38.8
Collaborating with others (e.g. projects)	56.3	56.4	37.6
Self learning	73.9	66.2	65.6
Tackling problems in daily life	62.4	57.4	55.2
Creative tasks	69.7	55.7	68.2

Pedagogy and school and teacher characteristics

The further correlational analyses of data indicated a complex inter-relationship of variables. Of particular interest in terms of policy is that, at both primary and secondary school levels, significant positive correlations exist between teachers' pedagogical use of IT (including their practice of encouraging/requesting students to use IT in learning tasks and the degree of student-centredness in classroom teaching) and teachers' beliefs about ITEd, their IT competence, and school IT resources and support although for the secondary school level, the correlations of the latter two are slightly weaker.

11.1.4 School and wider community

School IT plan and vision

Over 95% of schools reported that they had IT plans, but most of these had little input from parents, students or the community. Generally from 72.8% to 96.9% of school heads agreed that the goals of the school IT plan should include to improve student learning outcomes, make the learning process more interesting, strengthen students' initiatives, independence and responsibility in learning and develop students' analytical ability/creativity.

Impact on school administration and vision

High percentages of school heads agreed that ITEd has had positive impacts on school administration, improved communication within the school, improved communication outside the school, improved student records, improved teacher records and improved management of teaching and learning resources (Table 11.28).

Table 11.28: School heads' perceptions of ITEd

Impact	**% rating agree/strongly agree**		
	Primary	**Secondary**	**Special**
positive impacts on school administration	96.6	95.2	97.0
improved communication within the school	76.2	87.6	90.9
improved communication outside the school	90.2	87.6	90.9
improved student records	94.4	95.7	97.0
improved teacher records	93.0	92.5	96.9
improved management of teaching and learning resources	95.6	94.9	98.4

Activities to promote IT culture

The majority of schools reported to have, to some extent encouraged students to use IT in their daily lives, provided IT course for parents, participated in public ITEd exhibitions/competitions, organised sharing sessions for staff and participated in sharing meetings with other schools (Table 11.29). This suggests that quite a lot of schools have organized activities to promote IT culture within their own school but that relatively fewer engage in activities outside their own immediate school context.

Table 11.29: Schools' reported activities to promote IT culture

Activity	**% rating agree/strongly agree**		
	Primary	**Secondary**	**Special**
Encourage students to use IT in daily life	99.5	98.1	93.9
Experience-sharing meetings for staff	80.3	79.1	89.4
IT courses for parents	75.6	73.1	77.3
Participated in public exhibitions or competitions on ITEd	66.7	68.7	21.5
Experience-sharing meetings with other schools	61.6	64.9	78.1
Making school IT facilities accessible to parents/public	33.6	29.2	37.9
IT courses for community	19.3	17.2	15.1

Parents' attitudes and participation

Over 92% of parents reported that they welcomed the use of IT in teaching. Over 88% were very/quite/slightly willing to invest in improving their child's IT skills, which is an encouraging outcome. However, less than 14% reported that they had participated in IT training provided by their children's schools, less than 54% had ever browsed the school website and 91% or more had never communicated with the school via email.

11.1.5 Student learning

Students' liking for teacher use of IT in teaching

Students' liking for teacher use of IT in teaching decreased as the grade level increased (Table 11.30). From the student interviews a common response was that students said they prefer media-enriched teaching via IT but dislike text-based presentations. Also in the interview it was common for students to claim that they welcome appropriate/good use rather than more use.

Table 11.30: Students' liking for teacher use of IT, by grade level

Grade level	% rating agree/strongly agree
P3	85.6
P6	75.7
S2	62.8
S4	54.3
S6	42.4

Students' actual use of IT at school

Table 11.31 shows that students reported having little chance to use IT at school, except in computer studies lessons. Generally there is a slight increase across grade levels in the percentages reporting that they used computers less than once per week or not at all in subjects other than computer lessons, which suggests that use may decrease with increasing grade levels in general subjects.

Table 11.31: Students' actual use of IT in lessons other than computer lessons

		None %	< once per week %
Primary	P3	35.6	40.3
	P6	47.1	38.0
Secondary	S2	45.9	41.0
	S4	67.9	23.1
	S6	61.3	30.3
Special		20.4	39.6

Average time spent on various activities (from ITADL)

Table 11.32 shows the average time spent on various activities, as recorded in the ITADL. It can be seen that entertainment, including games, is one of the major uses of IT., particularly for S2 and S4 students. The time spent on using IT for communication increased rapidly across grade levels and there was a similar increase, peaking at S4, for entertainment-related activities. However, it is also clear that students spent significant proportions of their time using IT for learning-related activities at school and at home.

Table 11.32: Average time spent on various activities, as recorded in ITADL

Activity	Primary		Secondary			Special
	P3	P6	S2	S4	S6	
Classroom activity	25.9	35.8	56.0	79.8	142.2	125.5
School work	29.7	23.3	93.1	50.6	97.9	33.5
Self-learning/studying	32.8	30.7	51.4	25.2	34.2	16.4
Learning-related games	38.3	28.0	7.1	6.4	2.2	31.1
Communication	6.5	35.9	84.2	154.6	188.8	12.5
Browsing Internet	13.3	36.3	109.2	213.6	140.4	65.7
Listening Music	10.9	36.3	53.6	165.5	95.1	29.4
Watching Movie	8.1	16.0	18.3	30.2	20.9	11.5
Entertainment games	77.1	109.5	235.3	367.4	121.0	102.1

Minutes spent on activity per week

Confidence and software skills

Less than 18% of students indicated that they were not/not quite confident with IT skills. The majority of students claimed they were basically competent or above in searching the Internet (more than 81% except for P3 and special school students), online communication (more than 69% except for P3 and special school students), presentation software (more than 60% except for P3 and special school students) as well as word processing (from 42.4% in P3 to 75.6% in S6) and spreadsheets (from 47.4% to 56.9%, excluding special schools). They indicated that they were less competent in design and using multimedia software (from 10.8% to 40.3%).

IT Literacy: computer knowledge and skills

Table 11.33 shows the students performance in stage-specific ITLA Section 1. At all grade levels in the Primary and Secondary School Sectors, the mode is the 50-80% range and the percentages of students scoring 50% or above in P3, P6, S2, S4 and S6 are 83.3%, 85.7%, 88.6%, 88.1% and 93.9% respectively. The findings suggest that the majority of students have acquired a reasonable grasp of stage-specific computer knowledge and skills.

Table 11.33: Students' performance in stage-specific ITLA Section 1

	% correct		
	> 80%	50 – 80%	< 50%
P3	10.3	73.1	16.7
P6	27.2	58.5	14.3
S2	20.2	68.4	11.4
S4	25.2	62.9	11.9
S6	23.5	70.4	6.1

IT Literacy: generic IT skills

Table 11.34 shows the percentages of students claiming to be basically proficient or above in generic IT skills for solving learning-related problems and solving problems related to daily life. In P3, P6 and S2 the percentages indicating themselves to be basically proficient or above in skills for solving learning-related problems were higher than the percentages for solving problems related to daily life. However, the percentages claiming to be basically proficient or above in the two aspects of problem solving are more evenly balanced for S4 and S6 students.

Table 11.34: Percentages of Students' claiming to be basically proficient or above in generic IT skills for solving problems

	Solving learning-related problems %	**Solving problems related to daily life %**
P3	47.9	32.9
P6	66.5	49.1
S2	70.4	59.5
S4	61.5	61.1
S6	68.5	70.2

11.1.6 Inter-relationships with other factors

Primary

Complex inter-relationships were observed between students' learning outcome and other school, teacher and student factors. Of particular interest in terms of policy is the observation that students' learning outcome variables have significant positive relationships with:

- their use of IT for learning-related tasks outside school hours (four out of the six student learning outcome variables are significantly correlated with this)
- home ownership of computers (five out of the six student learning outcome variables are significantly correlated with this)
- students' perception of the sufficiency of IT resources and support in school (four of the six student learning outcome variables are significantly correlated with this)
- teachers' pedagogical practice of encouraging/requesting students' use of IT in learning-related tasks (three of the six student learning outcome variables correlate significantly with this).

It is interesting to note that students' use of IT in school is not related to any of the students' learning outcome variables.

Secondary

Again complex inter-relationships were observed between students' learning outcome and other school, teacher and student factors. Of particular interest in terms of policy is the observation that students' learning outcome variables have significant positive relationships with:

- their use of IT for learning-related tasks outside school hours (five of the six learning outcome variables correlate with this)
- home ownership of computers (also five of the six learning outcome variables correlate with this).

It is interesting to note that students' use of IT in school is positively related to only one of the students' learning outcome variables.

11.1.7 Future development of ITEd

Teachers' views

As can be seen from Table 11.35, high proportions of teachers agreed/strongly agreed that there is a continual need in future to increase allowances/funding to schools, increase human resources in schools, conduct IT professional development for teachers, provide IT resources on teaching and reduce the workload of teachers.

Table 11.35: Teachers' perceptions of future development in ITEd

Perceived need	**% rating agree/strongly agree**		
	Primary	**Secondary**	**Special**
Increase allowance/funding to schools	85.3	76.7	80.7
Increase human resources in schools	88.8	82.9	88.3
IT professional development for teachers	86.8	80.2	87.1
IT resources on teaching	89.5	84.1	91.4
Reduce workload of teachers	89.4	87.5	86.7

Other stakeholders' views

The following summarise the views of other stakeholders, including representatives of community organisations, tertiary institutions, parent, employer and teacher associations and the ITEd project owners and policy makers from the EMB.

<u>Policy and sustainability</u>

- Need for clear goals and objectives for pedagogical integration of ITEd
- Need for continued commitment to ITEd initiatives
- Need to maintain on-going IT specialist and technician support for teachers

<u>Resources</u>

- Increasing and renewal of hardware and peripherals
- Continue momentum of the past 5 years
- Central support for selecting and evaluating IT resources for teaching, e.g. collective licensing
- Need for wider range of educational software at low cost
- Web-based learning for students and online resources for teachers and students
- One-line budget
- More involvement of community organisations
- Give/sell old computers to students
- Partnership with publishers to develop software for local context
- Seek support from commercial and other sectors

<u>Pedagogy and teacher development</u>

- Increase sharing within/among schools and showcases
- Reduce teacher workload
- Incentive to teachers for using IT well
- Emphasis on appropriate pedagogical use rather than how to develop IT resources

<u>Student learning</u>

- Clearer guidelines for intended outcomes of effective application of ITEd
- Improved methods for assessing outcomes
- Changing assessment system to focus on learning rather than exam results
- Evaluate impact of IT on student learning

<u>Research</u>

- Encourage teachers to engage in school-based action research on ITEd
- Conduct and disseminate research about effective use of ITEd for different subjects and stages

- Use research outcomes to inform practice
- Explore how IT can be used to help or meet the unique needs of special school students

11.2 Links between Hong Kong's ITEd achievements and those of other countries

In order to evaluate the progress and achievements of the Hong Kong ITEd initiatives, it is useful to benchmark the Hong Kong figures with comparable data of overseas countries. Table 11.36 summarises some of the achievements or targets of some other countries, particularly some of Hong Kong's neighbours. It should be noted that there is a lack of uniformity in the information that has been provided by various countries, and contextual differences, different objectives, states of economic development, school systems etc. mean that it is difficult to make consistent comparisons. Hence, any comparisons that are made must be rough estimates.

Table 11.36: Summary of some overseas IT targets/achievements

Country/ Area	Number of Students per Computer Achieved (Year)	Target number of students per computer	Teacher Training Targets for 2004	Internet connection
Japan	(98/99) Primary 58.6 Lower Secondary 21.4 Upper Secondary 34.1	5.4 (2005)		100% schools with high speed constant access (2001) 100% classrooms (2005)
Korea	(2000) Special 9.2 Elementary 13.7 Middle 10.2 High 11.2 Trade High 3.5	5 (2005 target)	One third of all teachers will take duty training every year beginning in 2001 according to the Promotion Plan for ICT Utilization in School Education prepared by the Ministry of Education and Human Resources Development. Then every teacher will get duty training once every three years. One third of all the principals, vice-principals, and other education professionals are also expected to participate in the CEO training program on ICT use every year. Teacher: PC/Notebook ratio = 1:0.9 (2003) #	

Country/ Area	Number of Students per Computer Achieved (Year)	Target number of students per computer	Teacher Training Targets for 2004	Internet connection
Singapore	Initial targets were set at 6.6 for the Primary Sector and 5 for the Secondary Sector (at the time of setting up the Masterplan, i.e. 1997)	2 (2002) with computers provided in classrooms and other learning areas such as libraries and special rooms, besides computer laboratories to allow more convenient and effective integration of IT throughout the curriculum, and allow for its use both during and after curriculum hours.	A four-tier fan model will be put in place to train teachers in every school by 1999, within the constraints of manpower resources. 60 Senior IT Instructors form the first tier of training, which was completed in late 1996. The Senior IT Instructors will train schools in Phase 1 of implementation, comprising 22 Demonstration schools. Heads of Department (HODs) in charge of IT and selected teachers from each of these Phase 1 schools will then adopt and co-train 3 to 4 schools each, together with the Senior IT Instructors, in Phase 2 of implementation. These schools in turn will train those in the final phase of training.(See para. 42 for the schedule of schools in each phase	All schools will be linked through a Wide Area Network (WAN), which will eventually be connected to the high speed backbone of Singapore ONE. All teachers and pupils from Primary 4 and above will be provided with email accounts.
Taiwan			Information Literate Teachers: All Teachers Able to Use Computers	100% (1999) every school has basic bandwidth connection in a point-to-point base
Thailand	Primary 84 (2002) Secondary 53 (2002)	Primary 80 (2001)* Secondary 40 (2001)* Primary 40 (2004)** Secondary 20 (2002)*	2003: 71 000/358 000 primary school teachers and 25 000/125 900 secondary school teachers trained**	Target for Internet connection for 100% secondary schools (2002) and 100% primary schools (2004). Achieved (2002): 22.5% secondary schools and 1.19% primary schools

Country/ Area	Number of Students per Computer Achieved (Year)	Target number of students per computer	Teacher Training Targets for 2004	Internet connection
UK	Primary 7.9 (2003) Secondary 5.4 (2003)	Primary 8 (2005) Secondary 5 (2005)	The government has raised 230 Million Pounds from the New Opportunity Fund (NOF) to offer ICT training with the aim of increasing the expertise of serving teachers in the use of ICT in subject teaching, to the level expected of all Newly Qualified Teachers who enter the profession, and of improving the competence and confidence of school librarians in the use of ICT. The training started in 1999 and runs over three years. More than 250 000 have signed up for ICT training with more than 100 000 completing a training course.	
USA	Students per instructional computers with Internet access Elementary 8 (2000) Secondary 5 (2000)		$700 million was provided for the Enhancing Education Through Technology program in FY-02. This commitment was sustained in FY-03. … At least 25 percent of the funding must be used to provide professional development.	

Sources of data:
Japan: 98/99 data, Source: International Association for the Evaluation of Educational Achievement (IEA)/SITES.
Teacher training: http://www.mext.go.jp/english/org/eshisaku/eshotou.htm
Korea: http://www.logos-net.net/ilo/150_base/en/quest_n/qr_15_kor.htm#22
#http://www.unescobkk.org/education/ict/v2/info.asp?id=13246
Singapore: http:www.moe.gov.sg/edumall/mp2/mp2.htm
Taiwan: Tu & Twu (2002)
Thailand: *http://www.nitc.go.th/it-2000/it2000s.pdf
**http://www.unescobkk.org/education/ict/v2/info.asp?id=13246
UK: 2005 target: http://www.dfes.gov.uk/rsgateway/DB/SBU/b000421/bweb05-2003.pdf
Teacher training: http://www.eun.org/insight-pdf/UK_england_full_2002.pdf
USA: 2000 data, http://nces.ed.gov/quicktables/Detail.asp?Key=536
Teacher training: http://www.whitehouse.gov/infocus/education/teachers/sect2-6.html

11.3 Discussion

11.3.1 Access, connectivity and usage

As a result of the large injection of funding and the systematic plan to build up IT infrastructures in the 5-Year Strategy, overall, computer numbers in schools have far exceeded targets and have continued to improve, although student to computer ratios vary across schools. Compared to the situation in 1998, the student to computer ratios for all three school sectors have improved significantly. The figures also compare favourably to the 2001 figures reported in the Preliminary Study and were commented on by the Overseas Consultants to this project (Appendix VIII) as being on a par with other countries. Current student to computer ratios for primary, secondary and special schools in Hong Kong compare favourably with the targeted or reported ratios of most advanced countries, although they are higher than the Singapore target of 2 to 1. Connectivity in schools also appears to be very good and to have improved greatly, with 100% connection and more than 93% having broadband connections. What these data do not indicate, however, is the bandwidth per active user. As the Overseas Consultants pointed out (Appendix VIII), an Internet connection of 128 kbit/s into a small school of 100 students is more beneficial to students than 1 Mbit/s (i.e. 1024 kbit/s) into a large school of 1000 pupils. Again this compares favourably with most countries. Connectivity in school has improved greatly and all schools reported having Internet connections although not every individual classroom has network connection. Nevertheless, there were some comments, particularly from school heads, IT team members and teachers, that existing network and hardware infrastructures are already getting old and concerns were expressed about the need for future replacement/maintenance/upkeep of these.

It is interesting to note, however, that many of the teachers in the focus group interviews complained about insufficient resources if their computer rooms had twenty computers to serve forty students. This indicates the mindset is still prevalent that ‘adequate resources’ means one computer per student when in fact the literature on social constructivism suggests that small groups of students sharing a computer can be a good way to facilitate student-centred learning (Chadwick, 1986; Crook, 1994; Eraut and Hoyles, 1989; Gunterman and Torar, 1987; Hawkins et al., 1982; Hoyles and Sutherland, 1989; Kutnick and Marshall, 1993; Nastasi and Clements, 1991; Papert and Havel, 1991). While we are not necessarily suggesting this is the only effective pedagogical practice, it is certainly well supported as an effective way for promoting social constructivism, particularly when the emphasis is on learning <u>with</u> IT rather than learning <u>about</u> it.

The majority of computers in primary and secondary schools are located in specialised rooms. The number of computers in general classrooms, however, is relatively fewer. When there are no permanent computers in general classrooms in primary and secondary schools, teachers wishing to use IT need to bring in either notebook computers or equipment on a trolley. This could be one of the barriers to more integrated use of IT, since it means that the teachers have to make special booking and moving arrangements. Teachers and students also complained about the time ‘wasted’ in setting up the equipment. Extensive international literature suggests that when teachers have easy, consistent and frequent access to IT in the classroom rather than in the computer laboratory its use has greater impact on students (Barnett, 2001, 2003a; Becker, 2001; Ringstaff and Kelly, 2002; Yong et al., 2002) and also on the teachers’ confidence and competence to use IT (Jacobsen, 2001). In other words, there still needs to be further development of access, particularly in the general teaching rooms, if teachers are to be able to use IT effectively <u>in the classroom</u>. In terms of availability of notebook computers, it was noted that there tend to be more of these available in secondary schools than in primary or special schools. This may be one way of making computers more easily available in general classrooms.

The high priorities for expenditure of primary and secondary school IT budgets appear to be hardware, consumables and technical support, with relatively low proportions being spent on teacher training and development. This latter can be explained by two reasons. The first is that a separate non-recurrent ‘IT Training Grant’ was provided by EMB for staff training from 1998/99 to 2002/03. The second is that EMB provided teachers’ refresher courses, sharing sessions and seminars and in addition to this staff development often took the form of internal sharing sessions within schools, hence the cost was low. It is a matter of concern that most of the school heads, IT team members and teachers are still placing their highest priority on hardware, hence it is important to change the mindset that more and better hardware is a necessary pre-requisite to effective IT use, and to develop the understanding that effective teaching can still be done with relatively basic equipment. In fact, during classroom visits the project team observed that many of the IT-supported instruction that captivated students' interest and motivated them to think did not necessarily involve the most advanced technology or sophisticated equipment but a creative and pedagogically sound design of teaching and learning activities that were aligned with the instructional objectives.

There was evidence of a culture of using IT amongst the school heads, teachers and students. Almost all of them make some use of IT both in school and at home. This was not the case five years ago. Home ownership of computers is very common for school heads, teachers and students. All make significant use of computers at home and it is clear that students' use of IT outside school hours is greater than their use of it in class, probably because they actually have more hands-on opportunities to access computers at home than they do at school. Home ownership of computers in Hong Kong compares favourably to one international study that provides relatively recent data about home ownership in the UK (Becta, 2002a). Parental attitudes and beliefs, for example about how their children are using computers and the impact of the availability of a computer at home on academic results, appear to have impact on students' access to as well as use of computers at home. These data indicate that a lot of potential learning opportunities will be lost when schools cite lack of computers in some students' homes as a reason for not assigning out-of-school IT-related tasks. The issue, of course, is how to ensure access outside schools hours for those who do not own a computer at home.

This has potential implications for teaching and learning, as home ownership of computers has been found to be related to students' learning outcome, hence there appears to be a great but as yet relatively untapped potential to encourage students' use of home computers to enhance the effectiveness of IT on student learning. This observation is also supported by the findings of Becta (2003c) and the suggestion made by Lee et al. (HKIEd, 1998) that having a computer at home/outside school is important because it can enhance students' skills and help equip them with the necessary skills for IT-related work at school. Overseas, this potential to integrate learning between home and school has been supported strongly in the UK by a study that showed ICT can be used to make radical changes in these links (Becta, 2003b). Furthermore, the PISA, 2000 study (cited in Karpati, 2003) found a very strong relationship in the majority of countries surveyed between students' achievement levels and availability of IT, particularly Internet access, in the home. During the school visits it was observed that a few schools had collected their own data about the numbers of students with home computers – it may be worthwhile for other schools to do the same in order to obtain accurate pictures about the students' access and hence to assess the potential within individual schools to make greater use of home access.

The most popular home use, as reported by the students, is related to entertainment and communicating with friends, particularly for the older students, although time is also spent on browsing the Internet and doing some school-related tasks. Again these patterns of usage are similar to those described in the Preliminary Study and in the Becta (2002a) study in the UK. A clear implication of this is that home computers seem to have more impact on students' usage patterns than do the computers at school. Where they used their home computers for specific learning-related purposes, this appeared to be more likely to happen if they were encouraged directly by their teachers – thus indicating the importance of teacher direction even for home use.

While the patterns of home access to and use of computers are high for most students, it was noted that some special school students experience problems in association with home use because they have special requirements for assistive devices and these are either not readily available for them to use at home, or their parents or other supporters at home are not trained in the use of these devices. Furthermore, in special schools the allocation of resources has been described by some practitioners as unequal and not enough, that is with respect to not enough money to provide the specialised equipment that is needed above and beyond the kind of equipment that is provided to schools in general.

11.3.2 Teacher enablement

Another priority in the 5-Year Strategy was the professional development of teachers. The ITEd targets with respect to teachers' professional development appear to have been achieved. Most teachers have reached intermediate level or above, even though it must also be noted that about 25% of the teachers surveyed still considered themselves non-users/novices/beginners in the adoption of ITEd and only 54-68% rated themselves proficient in applying/integrating IT into their subject curricula. Nevertheless, the fact that such high percentages of teachers have attained IIT or above places Hong Kong as one of the countries with the largest proportion of teachers trained. This may have important implications as a first step in increasing classroom use, since other studies (e.g. Becker and Riel 1999) have found a direct relationship between teachers' skills competence and the amount of time they use computers in the classroom. However, it must be noted that this is only a starting point and that those teachers who make effective use of computers in the classroom are those who can combine their technical skills with experience in using computers professionally (Becker and Riel 1999) and who have confidence in using a wide range of ICT resources (Becta, 2003a).

As mentioned above, it was noted that, despite the extensive training under the ITEd initiatives, a small but significant proportion of teachers are still seeing themselves as lacking competence or confidence, especially in regard to applying/integrating IT into their teaching and learning, such as through interactive design, exploration and student-centred learning. While proficiency to use at least the basic software is satisfactory, some teachers lack confidence or are experiencing difficulties with setting up or trouble-shooting with technical difficulties. Further evidence came from the teacher interviews that these teachers feel they do not need so much technical expertise but rather more knowledge about effective pedagogical use of IT. This also seems to reflect the findings of SITES-M2 (Kozma, 2003) that the majority of teachers across countries are adequately prepared with respect to general applications such as word-processing, database and spreadsheet software use, but that fewer are prepared adequately with respect to the instructional aspects of ICT. The qualitative data collected from teachers and specialists/therapists in special schools revealed that these practitioners felt that their particular needs are not catered for as well as their counterparts in mainstream schools. One reason they gave for this is that they often need to use software and materials that are custom-designed to meet individual students' needs and they do not feel that sufficient support is available for them to do this. In addition, the practitioners in special schools suggested that professional development programmes were tailored more for teachers in mainstream schools than to help them to utilize IT to meet the unique needs of their situations and their students.

It has been indicated clearly in international literature that the benefits of IT do not happen automatically just because the technology has been provided (HKIEd, 1998; Barnett, 2003a; Wellburn, 1996) and the need to address a complex interplay of infrastructure, training, curriculum and pedagogies is supported by a strong body of literature (Becta, 2003c; Bodilly and Mitchell, 1997; Glenna and Melmed, 2000; Law et al., 2000; Sivin-Kachala, 1998). In Hong Kong it has been reported that teachers changing their practices in the classroom can have positive effects on challenging and extending individual students (Lee, 2002b).Therefore it is important to address this gap.

A lot of teachers have expressed the need for continual professional development in ITEd, through sharing sessions within schools and among schools, particularly within subject groups, regarding effective IT use and good practice. Professional sharing and reflective practice have been shown, internationally, to be the most effective way of helping teachers to maximise the positive effects of integrating IT into their teaching programmes (Lee, 2002b; Ringstaff and Kelly, 2002) and that the most effective form of staff development for ITEd is subject-based sharing of strategies (NCREL, 2003; Sherry & Gibson, 2002). There was some suggestion in the data that the special school teachers and specialists/therapists are already inclined to communicate with others working in similar fields, to provide mutual support for each other. However, since the students' needs and related pedagogical measures are very different among different schools, mutual support, although needed, is rather limited.

Those involved in research, mainly the tertiary institution representatives, emphasised the importance of tertiary institutions and schools engaging in systematic and structured research to inform decision making and provide examples of good practice for teachers. Very few of the teachers surveyed had participated in research on school-based initiatives. It may be useful if more teachers are encouraged to participate in such research as some international literature indicates that school-based action research is one of the most effective ways of bringing about change in teachers' paradigms (NCREL, 2003; Kozma, 2003). It was noted, however, from some of the focus group interviews, particularly with teachers, that some schools with well-developed ITEd programmes are engaging in various ways in sharing their expertise with other, less-developed schools.

There is clearly still a need for continuing professional development for teachers. One example of an ongoing model is that adopted in Korea (see Table 11.36), in which teachers are required to undertake training in three-year cycles. In order to meet this need it is important to make provision for a staff development budget. Another is the Singapore model, in which IT coaches from the Educational Technology division are sent to schools to train teachers in pedagogical principles (Ping et al., 2001).

While around 80% of the teachers reported that they were motivated by intrinsic factors to learn to use IT, for example to enhance their teaching, the motivators to apply it in teaching are more extrinsic, for example societal trends and expectations by others. Relatively smaller percentages see enhancing students' learning outcomes as a motivator for them to use IT in their teaching. If teachers believe that teaching is about helping children to learn, this should be an important factor in deciding whether to use IT but these results hint that teachers' conceptions of teaching is very much teacher-centred rather than learner-centred. It seems they still do not see the potential for IT to be used as a tool to actually enhance student learning outcomes. It appears that most teachers want to use IT to support their teaching but it may be that to date many of them do not really know how to do this. It may even be speculated that this suggests some mismatch between a general impression that IT will improve teaching and a lack of understanding of how this can actually occur. However, given the high number who said they were motivated to use IT by their growing maturity in IT literacy, this may be an inevitable developmental stage in the process of change. There is certainly some international literature that suggests it may be a common trend for teachers to have a natural resistance to changing their pedagogy to incorporate computers (Newhouse, 2002) and to go through different stages of development in the use of IT (for example, King, 2002).

Overall, the impact of IT on teachers, as reported by the teachers themselves, was much less favourable than the perceptions of the school heads. There is some suggestion that the school heads tended to underestimate the negative consequences of IT for teachers such as causing stress or creating extra pressures on time. The heads seem to have a more rosy picture than that perceived by the teachers. It is therefore recommended that these issues be brought into discussion in professional development forums so that the teachers' needs and difficulties are fully understood and addressed.

The relatively high percentage of teachers in all three school sectors rating 'lack of knowledge/skills' as a difficulty encountered when using IT in teaching suggests that there may be some discrepancy between the training they have received and that which they need for further development. The data from the Special School Sector has identified one group of practitioners, namely the specialists and therapists, who expressed that there is a lack of customised training or professional development for their unique roles in using IT not only for teaching and learning but for helping the students with life skills.

The major obstacles cited by school heads, teachers, and IT team members, along with teachers' lack of skill to apply IT to education and lack of suitable software, were teacher workload and the demand for teachers to spend time preparing their own materials detracting from the quality of their teaching. This point to the fact that it is not realistic, or even desirable, to expect every teacher to have advanced IT skills required to create teaching resources. Instead the focus should be more on developing their understanding of good and appropriate pedagogical use of IT for achieving curriculum objectives.

What matters most are educational strategies for using technology, particularly strategies that can influence the students' total course of study (Erhmann, date unknown). It also highlights the need for teachers to have good technical support if they are to use IT effectively in their teaching – and it was certainly stated clearly by the school heads and teachers in questionnaire open comments and interviews that they need this support to be continued. The importance of spending on technical support was also emphasised in the UK NGfl Pathfinders evaluation (Becta, 2002b). The issue of inadequate software resources was particularly mentioned by the special school teachers. Often they need different software that is tailor-made to suit the unique needs of individual students, and they expressed the concern that this is not easily available to them.

11.3.3 Curriculum, pedagogy and resources

There is clear evidence of increasing use of IT by teachers, particularly for searching for information and preparing notes/course materials for teaching purposes. In discussing IT use in the curriculum the focus is not only on percentage of use but also on the effectiveness and appropriateness of use. It is interesting to note that there is some discrepancy between what the school heads perceive is happening and what the teachers and the students report as happening. School heads tend to report more frequent use of IT, to have a more positive view of the impact of ITEd and to underestimate the stress and barriers encountered by teachers. There is also some inconsistency between teachers' espoused beliefs and their reported roles in teaching.

There is evidence of increasing use of IT in teaching and learning across KLAs since the Preliminary Study. Where IT was reportedly used in classrooms, most of the reported use was by teachers rather than students. A lot more of the teaching time was spent on teacher-centred activities such as explanation and demonstration. There was relatively less opportunity for individual interaction with computers and even less for collaborative interaction focusing on facilitating learning and assessment. There was, however, evidence of some degree of encouragement or request from teachers for students to perform a variety of tasks with IT. As reported in the Preliminary Study, the most common use of software is still for teacher presentation of materials and while there appears to be a slight shift from the expository paradigm to a more student-centred one, this change is happening very slowly. However, it must be noted that this pattern of slow change is a general one reported internationally (Kozma, 2003). There is also evidence of some paradigm shift away from the use of print sources in preparing lessons, which implies some conscious integration of IT by teachers into their daily routines. In the special schools there is some evidence that IT is helping teachers to design special individual programmes to assist learning and diversification of training. What has not been supported by these data is whether teachers know how to use it effectively for promoting student-centred learning. As the Overseas Consultants pointed out (Appendix VIII), computer use is no guarantee of learner-centredness and more than just the provision of computers is needed if practices are to change from teacher-centred to learner-centred. Nevertheless, the Overseas Consultants did indicate that the data from this Study hint that Hong Kong has made a reasonable start in this direction. There appears to be some evidence that some teachers at both primary and secondary levels are using publishers' slides per se without making any modifications to suit their own teaching. This practice may not be conducive to creating an effective student-centred learning environment. It has been suggested that computer assisted resources may not be easily transferable between contexts (Pitcher, 1998) and there is a danger of using some teaching resources just because they are available and not necessarily because they are the best for the purpose and context (Lambert and Williams, 1999). In a traditional teacher-centred approach it may be possible for a teacher to use ready-made materials but when the teacher is in the role of facilitator in a student-centred environment there needs to be provision for the students to interact with the material and the environment as well as with each other (Kistan, 1996). Hence it is important that the choice of teaching medium and materials be incorporated as a part of the curriculum development planning phase, not added on, whereas to use ready-made materials suggests that it may be added on and hence not able to be used flexibly (Kistan, 1996). Ready-made materials may contain the desired content but do not necessarily provide for other instructional events such as interactions between students or to meet the exact objectives and context of the lessons. Therefore it is important for teachers to design their presentation materials by ***selecting from*** available materials and making decisions about how to manage them for instruction (Gagne and Briggs, 1974) rather than adopting ready-made materials without making any modifications.

There is still little evidence that teachers are taking a constructivist approach in terms of using IT to encourage students to construct knowledge based on discussion and collaborative activity. There is little evidence of technology being used to promote interactive learning processes or tasks requiring higher-order thinking skills, either through software used in the classroom or through the use of the Internet or school intranet, although this may also reflect the broader pedagogical situation rather than the specific pedagogic use of IT. Nevertheless, similar patterns have been reported that most teachers are still caught in traditional paradigms and that many do not use IT even when it is available (OECD, 2004; SITES, 2003) and that most are still using it to add to or enhance their existing practices (Becta, 2003a). Clearly the provision of computers and software alone will not help unless teachers are convinced of the need for pedagogical change. The problem is to change teachers' thinking, hence the urgent need is not merely to provide more computers and software but to change teachers' conceptions of teaching and learning – which is a long-term task. The Overseas Consultants (Appendix VIII) have suggested that the government and schools should find ways to support subject-specific, learner-centred, technology-enabled curricular improvements. This notion is also supported by Lee (2002a), who suggests that change does not happen quickly and that we should first be concerned with good curriculum content and then with the incorporation of technology.

There are, of course, pockets of IT use that engage a more student-centered, enquiry-based learning, but this is not widespread according to the data collected in this Study. The evidence that most teachers are not using IT effectively despite the apparent availability of software from EMB also raises implications about the need to change teachers' beliefs, since the IT they use and how they use it is directly affected by their beliefs and understanding about teaching and learning and research has shown a correlation between constructivist beliefs and use of computers (Becker, 2001). As reported in the SITES-M2 (Kozma, 2003) study, it is when IT is treated as just one thing interacting within a context of school improvement or reform that it can be effective in contributing to paradigm shifts towards more student-centred, constructivist approaches on a widespread scale. Only about one-third of the teachers surveyed said they have made suggestions about the purchase of software. It does not seem to be conducive to encouraging teachers to use the software effectively in their classes if they have not been instrumental in making the choice of what to use. It is encouraging, however, that most teachers are at least aware that there are better ways to use IT other than through using presentation tools to support a teacher-centred approach. What they lack – but want – is guidance about how to do this.

Another implication for effective pedagogical use of IT is linked to the previously-mentioned issue of location of computers within schools. Insufficient access to computers has been put forward as one of the obstacles to effective implementation of IT in teaching and learning. As reported above, there are plenty of computers in schools but there is a suggestion that the way in which they are set up, with the majority in computer laboratories, is contributing to the difficulties. In fact, there is evidence to suggest (Becker and Riel 1999; Becta, 2002b) that the setting up of computers in designated laboratories or multimedia centres does not support the idea of integrating IT into the curriculum. Added to this is the issue raised in stakeholders' groups interviews that even the layouts of some computer labs are not conducive to good pedagogical practice. This may explain why teachers' and students' data indicated some dissatisfaction with the adequacy of resources and support.

Use of IT for assessment and evaluation is still not a common practice. Only around half or less of the teachers saw benefits in using IT for evaluating students with the larger percentages believing the main benefits to be that it allows greater flexibility in both time and place for evaluating students, and that it is easier to follow up on student evaluation. In the Special School Sector reasonably high proportions of teachers and specialists/therapists said that they had used IT for evaluating students' learning progress and efficacy and processing student evaluation data.

To understand more about what is needed to bring about a paradigm shift, it is necessary to look at the relationship between IT, pedagogy and the wider education system. The most common reasons given by teachers for not incorporating IT use into their teaching are linked to this big picture, since they say they are restricted mainly by insufficient time, excessive workload and the pressures of the public examination-driven system (which probably accounts for the lower usage of IT by upper secondary school forms). This is consistent with international literature which suggests that issues of access, time and workload are commonly seen internationally as barriers to teachers making effective use of IT in the classroom (Barnett, 2001; Becta, 2003a; Ping et al., 2001; Sherry and Gibson, 2002). What is needed is not to blame the schools or teachers, but to provide space and opportunities for them to develop. Further analysis of the data, described in Chapter 8, suggests that teachers' pedagogical use of IT is related to a number of school and teacher factors, including school IT culture (for Primary School Sector only), school IT resources and support, teachers' IT beliefs and competence. Furthermore, teachers' pedagogical use, particularly encouraging/requesting students' use of IT in meaningful learning-related tasks, is related to students' use outside school hours. Needless to say, a lot of variation was found in these aspects across schools as well as in the extent and nature of adoption of ITEd.

One interesting point that emerged in relation to curriculum, pedagogy and resources is that, when asked to identify their main sources of support when they encounter difficulties in using IT, the majority of teachers indicated that, other than school-based technical support, they sought it from friends or relatives or other colleagues rather than turning to other sources such as EMB or to self-help strategies. This suggests the importance of peer support and presents a compelling argument for school-based technical support. In the case of some of these special schools, the need for technical support is even more important, since these schools rely on the use of IT not only for teaching and learning but also for enhancing students' life skills, providing therapy and developmental support, etc. The different, unique natures of curricula in many special schools pose particular problems in relation to issues such as delivery and the availability of teaching materials.

The school heads suggested that the greatest support need is for increasing/upgrading computers, peripherals and software, thus implying that resourcing is still perceived by heads as one of the main concerns. Relatively lower, but still a significant, proportion of school heads recorded the need for supporting teaching-related issues such as integrating IT into the school curriculum, using IT in teaching/assisting teaching, enhancing the IT skills of teachers and students or using IT to support students with individual needs.

11.3.4 School and wider community culture

The evidence from this Study suggests that a culture of using IT in schools, at least for administrative and teachers' use, has been growing to some extent. All stakeholders agree that ITEd is important, but of course there are variations in school IT cultures. There are some school heads who are very strong supporters and active participants in their school's IT culture while at the other extreme there are some who are merely making minimum effort just to satisfy EMB basic expectations. This is in spite of the fact that, as noted from the EMB Document analysis, some specific training was provided for school heads with respect to the development of IT culture and IT plans within their schools. It may give some insight about the slow development of IT use in schools, based on the findings reported in SITES-M2 (Kozma, 2003) that most successful innovations are linked to schools' IT policies and active support or participation of the principal. However, this result is not surprising, since other Hong Kong studies (Yuen et al., 2003) have found that there are distinct models of change management related to the implementation of IT in schools, that are determined by different established visions and values of the schools, the perceived role and impact of ICT in education and the established culture and reform history of the school.

It is common for schools to have an IT plan, but there seem to be some inconsistencies in the school leaders' beliefs and visions. For example, while most say their school IT plans are based on the need to improve learning processes and outcomes, including affective outcomes such as initiative, independence and sense of responsibility in learning, fewer give priority to the kinds of co-operation between students and collaboration across curriculum areas that can help to bring about these outcomes. Again this might give some insights into the slow pace of change, since international research (for example SITES-M2 (Kozma, 2003)) have indicated that the schools who engage in planning for and evaluation of IT integration seem to have the strongest IT school cultures, with more support of teachers' and students' use of IT.

Most school heads reported a positive impact of IT on school administration and management, with high percentages agreeing that ITEd has had an impact on school administration or management with respect to improved communication within and outside the school, improved management of student and teacher records and improved management of teaching and learning resources.

There has been relatively little consultation, if any, with parents, students or community members in developing school IT plans. However, the evidence that nearly half of the teachers said they have participated in planning or promoting the use of IT in teaching or the integration of IT into the curriculum shows some promise that a reasonable number are beginning to take some leadership role.

There was some evidence of an increased culture for sharing among schools, and more than 70% have organised activities to promote IT culture such as extra-curricular activities for students, courses for parents, and IT competitions. This kind of activity was reported by more secondary schools than primary or special schools. Those school heads whose schools have intranet have some clear views about how this can be used to encourage the development of a school culture of sharing and communication. Low proportions of school heads said that they use IT for communicating with staff or students within the school. This is not surprising, however, since there are probably other more practical ways to communicate within a school, particularly at primary school level where the staff is smaller. Generally, while there is a great deal of potential to use IT for communicating with the wider community (e.g. with parents or between schools) this is not yet being utilised fully.

At first appearances it seems that the number of school heads indicating they make their school IT facilities available to the general public is very low, although this kind of use has increased since the Preliminary Study. The patterns are similar to the Preliminary Study, which found that the secondary schools were more outreaching than the primary schools, although the outreaching activities were few. They are also similar to the findings of SITES-M2 (Kozma, 2003), which reported only a few cases around the world of IT breaking down barriers between schools and community. However, this is not so bad when considering the potential difficulties in terms of finance and manpower associated with this practice. It seems that if this practice is to increase it would be necessary for the EMB to set up more incentive and support structure that will enable schools to overcome the potential barriers and obstacles.

While a majority of school heads acknowledged the contribution of EMB to promoting a community-wide culture using IT, the other major contributors were identified as groups within the IT industry. Particularly notable was the low number acknowledging the contribution of professional education organisations, and even the tertiary institutions were not rated as contributing by a particularly high number of respondents. It appears, therefore, that there is some scope for increasing the participation of these professional community bodies. There appears to be a potentially rich source of support to be obtained from collaboration with industry and trade associations that, as yet, has not been tapped into.

Another issue that was considered in relation to the school and wider community culture is that of how IT is used to encourage parents to be a part of the school community. Parents do not seem to have time to participate in IT courses organised by their children's schools. However, almost half of the primary school parents surveyed, but fewer of the secondary school parents, have at least participated in the school community by browsing the school's homepage. Of those who have not, about one-third stated lack of appropriate technical knowledge as the reason for not doing so. It appears that this potentially valuable resource for informing parents about the school and enhancing communication between teachers and parents is, at this stage, being under utilised. However, there is evidence of the influence of parents' views of how their children use IT and its potential impacts on their academic results on students access and use of IT and their ITEd learning outcomes. Furthermore, parents seem to agree that IT has become a part of daily life and to believe that using IT effectively can be beneficial to their children's future prospects, suggesting that they are at least on-side about ITEd even if they are not willing or able to participate actively in the school's IT community culture themselves. It may be that more education and encouragement for parents to participate will contribute to breaking down the home/school barriers that currently exist.

Overall, from the data presented in this section, there appears to be a distinct pattern in the development of an IT culture within all school sectors. To this stage, the evidence suggests that where an IT culture exists it is still within the school and the nucleus is mostly administration, with some schools having expanded beyond this to develop teaching and learning cultures still within the school. Some schools have expanded their culture to include activities with other schools, still focusing on students, and then to incorporate parents, still a part of the school community. Matters related to extending beyond the boundaries of the wider school community are currently being given relatively low precedence.

11.3.5 Student learning

This section considered student learning from different viewpoints. One is students' actual competency and perception of their competence and confidence with IT skills. Another is their actual usage in school and out of school, and a third addressed affective characteristics such as attitudes and beliefs. It is important to consider all of these aspects of learning outcomes since international studies and at least one Hong Kong study (HKIEd., 1998) have found that even if students are strong in technical skills such as operating a computer and 'critical' skills such as being able to evaluate Internet content, there is still a weak correlation between this and their school use. There are little data from this Study to show if students have become more inquisitive or creative, developed capabilities for processing information effectively and efficiently or for independent lifelong learning, as a result of the lack of valid and reliable measures of these and the paucity of baseline data.

The first section of the IT Literacy Assessment (ITLA) was designed to measure students' computer knowledge and skills. The results indicated that the majority of primary and secondary school students have a reasonable grasp of the stage-specific knowledge and skills about computers, but with considerable variation across students. In the Special School Sector the results were not as encouraging, with the majority of Stage 1 students indicating a reasonable grasp but low percentages in Stages 2, 3, and 4. Section 2 of the ITLA aimed to measure students' self-perceived competence in generic use of IT to support learning and other tasks. Except for P3 students, which is understandable in view of their young age, the majority of students reported that they had at least basic competence in using IT for learning tasks, for example for searching for information. When it comes to higher-order skills such as using IT to solve problems in learning or in daily life, most students consider themselves to be reasonably competent. This pattern is similar for all three school sectors, although the percentages rating themselves as competent were comparatively lower in the Special School Sector. It must be noted that the ITLA does not give any information about students' information skills, such as their ability to evaluate information critically or organise it.

In relation to other self-perceived abilities in hardware and software use, again with the understandable exception of P3, students tended to report that their generic skills are quite good especially for commonly used tools like word processing, image editing, Internet browsing and communication tools but relatively low for usages such as multimedia production and creation of web pages and databases. Students generally reported themselves to be quite confident in using IT.

In looking at students' actual computer use, the IT Activity Daily Log has provided a rich set of data about the amount of time students spend on different activities. The time spent on entertainment, games and browsing the Internet was reported as the highest, suggesting a 'culture' of using IT primarily for entertainment and communication, however the amount of time spent on learning-related activities was also reported as reasonably high, which challenges the common perception that young people spend all of their out-of-school computer time playing games. Students overall rated learning-related activities as the most important, but rated them relatively lower for liking, whereas the entertainment-related activities were rated low for importance but high as the ones they like the most.

While there is not very high in-school use of computers by primary, secondary or special school students themselves, there is evidence of a gradual shift towards more use by students and towards more project work from P6 upwards. This may be linked to the fact that there is strong encouragement from EMB for schools to undertake project work from around P5, with set guidelines and procedures for using computers to search for information etc., and may be an encouraging sign of a shifting paradigm. The fact that searching for information on the Internet is one of the most commonly-reported activities by students across all levels is consistent with international literature (Becker and Riel 1999; Becta, 2003c) that teachers tend to see information acquisition as one of the primary objectives of their instructional use of computers. The low patterns of computer use by students themselves in class activities, however, corroborate the findings to Research Question Set 3, that IT use in schools is still more about use by the teachers than by the students themselves. These patterns are consistent with the findings of Becker et al. (1999) with teachers in the USA and further reflect the teachers' conception discussed in Research Question Set 3 that teaching is about knowledge transmission. However, the further analysis described in Chapter 8 revealed some interesting implications for students' use of computers at home. Home ownership of computers by students is positively related to their learning outcomes and in the case of primary students, their use of IT outside school hours. Furthermore, students' learning outcomes have been found to be related more consistently to their use of IT for learning-related tasks outside school hours than their use at school. In other words, the data suggest that where student-centred learning has occurred this has often taken place outside the classroom, for example in project work. There is a clear implication here that student-centred learning does not, therefore, necessarily have to take place only in the classroom.

School heads, teachers and students all reported a strong belief that ITEd has had impact on students' increased subject knowledge, improved computer skills and learning effectiveness, as well as affective factors including stimulated interest and increased initiative to learn. The majority of students themselves reported that IT use had increased their knowledge. Special school students reported that the use of IT had widened their perspectives through interaction with the outside world. In all cases, however, the perceived impact on information processing ability and communication and expression skills is not so high considering that these are important aspects of a student-centred approach to teaching and learning. However, it is also clear from the data that the use of IT alone is not a guarantee of interest. Real motivation and interest come from carefully designed interactions with teachers, peers and materials appropriately supported by IT (Becta, 2002a; HKIEd, 1998).

It must also be mentioned that the School Document Analysis revealed that most documentation, such as school IT plans, was concerned with teachers' attainment of IT targets but very little mention was made of students' target attainments. In other words, it appears that most schools conceive targets in terms of quantity of hardware and numbers of teachers to have received training rather than student learning outcomes. This may explain why there was so little evidence of schools providing students with IT literacy training as opposed to IT skills. In particular there has been relatively little attention to date given to developing students' information and higher-order thinking skills as compared to information technology skills (as defined by Gawith, 1994 and described in the Literature Review, Chapter 2). As can be seen from the description of indicators set and strategies used by other countries discussed in Chapter 2, Section 2.3, this is a common direction that is being taken internationally although, as yet, there are very few consistently used benchmarks. That students' actual information technology skills should not be affected adversely by this change is suggested from the overseas research evidence that students can acquire IT skills during the process of using the IT as a tool to facilitate learning in curriculum areas just as they do in isolated IT classes (Kozma, 2003). This is something to be aware of in the next phase of the ITEd initiative, to increase the focus on learning outcomes rather than solely on the acquisition of hardware and teachers' skills.

One important point that needs to be addressed with regard to the Special School Sector is that when we look into the breakdown of the data with respect to learning outcomes, we find much lower ratings for MR students which, in many cases, are ratings given by teachers rather than by students themselves. This raises the question of (1) whether the students are able to give reliable self ratings of their IT literacy or competence, and (2) whether ITEd carries the same meaning for this group of students as for their counterparts in primary and secondary schools. In other words, there is a problem of defining and measuring IT literacy for students with special needs.

Apart from P3 and special school students, majorities of students indicated that they had played leadership roles in IT, for example through engaging in self-learning of new computer skills/knowledge, recommending useful websites/software/hardware to classmates/friends, teaching others and helping others. In the case of both P3 and the special school students, majorities engaged in the first of these actions, although relatively few reported having taken on any of the other roles.

11.4 Conclusion

It must be remembered that the ITEd initiatives have been in place for only five years and within those five years it has, of necessity, taken time for things to build up. This is consistent with international findings (for example Dwyers et al., 1990; Newhouse, 1999) that change often takes up to five years to get started. So, depending on the stage of development of the school, we are really talking about what has occurred in less than five years. From the findings reported in this Study, and the comparisons that have been made to international data and the Hong Kong *SITES-M1* (1998) and the *Preliminary Study on Reviewing the Progress and Evaluating the Information Technology in Education (ITEd) Projects (CITE, 2001),* it is undeniable that there has been huge progress in ITEd in Hong Kong schools, as reflected by the significantly improved infrastructure, the high proportion of staff trained, the emergence of a culture of using computers by school heads and teachers in their daily work, the widespread use of computers by students for learning as well as for other purposes, and the general perceptions of school heads, teachers, students, parents and other community stakeholders about the value and importance of ITEd. Credit should be given to all the parties involved for having achieved all these.

Chapter 12 Issues, Barriers and Recommendations

This chapter focuses on the future directions of ITEd in Hong Kong. The first section summarises some of the issues and barriers that have been identified that need to be addressed in the next stage of implementation. The second section proposes a number of recommendations for consideration in the next stage.

12.1 Issues and barriers

A number of issues and barriers have been identified from the discussion in Chapter 11 which need to be addressed in the next stage of implementation. They are summarised below.

12.1.1 Access, connectivity and usage

- Infrastructure –In cases where there is no IT equipment in classrooms, teachers tend to not use IT rather than move the class to another room. Even though the investment is there in terms of hardware, most computers are placed in specialized rooms, which is restricting their use. This issue also has implications with respect to the trend in other countries to locate computers in general classrooms. Without IT-equipped general classroom, teachers have the reason (and excuse) of not using IT.
- Network and hardware infrastructures are getting old and replacement/maintenance/upkeep is an issue of concern to many of the stakeholders. In order to maintain the momentum with ITEd in Hong Kong, it is important to give consideration to this.
- Home ownership of computers has been found to be related to students' learning outcomes, hence it is our view that how to ensure and facilitate students' access to computers outside school hours needs to be addressed.
- In special schools the allocation of resources has been described as unequal and not enough, i.e. with respect to not enough money and also with respect to lack of specificity of resources and training for teachers and specialists in special schools, implying that they actually need more resources to be able to meet these specific needs.
- Regarding special school students' usage at home – students (at least those with special educational needs) are very dependent on the teaching and learning activities or materials uniquely prescribed by teachers or therapists, thus they are not in control of their learning, probably because of lack of appropriate support resources. This point was particularly noted by the Local Consultants Team (Appendix VII). Teachers feel inadequate in their ability to use IT particularly because of the difficulties associated with students being able to use it at home when special assistive devices are needed.

12.1.2 Teacher enablement

- There is still a small but significant proportion of staff who are not comfortable and competent in using IT in teaching; some still adopt a negative or indifferent attitude feeling that IT is not very important or useful for their particular subjects even though they may believe it to be 'good' in general.
- While proficiency to use at least the basic software is satisfactory, some teachers lack confidence or are experiencing difficulties with setting up or trouble shooting with technical difficulties. Another problem is that the training they receive is mostly in the use of generic software rather than the pedagogical use of IT in their subject areas and they quickly forget about it due to lack of opportunity to use it. There is a clearly expressed need by teachers for more training and support for applying/integration of IT in their own subject teaching.
- Regarding teacher and specialist training in the Special School Sector – teachers and specialists

do not feel their needs are being met with respect to specialized training to meet the needs of their special school students. They should be provided with support to develop non-generic software that meets the specific needs of these students – this is why they have formed groups among themselves to provide mutual support in training.

12.1.3 Curriculum, pedagogy and resources

- Classroom teaching is still very much teacher-centred with or without the use of IT, and there is very little opportunity for students to think or create their own knowledge or understanding. This is not solely the fault of the teachers but rather a consequence of the interaction of a number of dimensions that can affect the need to adopt this kind of approach – physical setup, infrastructure, curriculum, public examination system etc. These cannot be dealt with simply by giving more training or setting quotas for the minimum use of IT but rather, the development of a shared understanding of the role of ITEd in the educational reform and full integration of ITEd into the ongoing curriculum revision/development exercise.
- Issues of access, time and workload, that are commonly seen internationally as barriers to teachers making effective use of IT in the classroom are still the major obstacles.
- Schools differ in terms of stages of development and we have found a lot of variations with respect to structure, teaching and students' learning rather than the overall picture being a uniform one. Some schools are mature, some are still maturing, and some are still struggling with the implementation of ITEd in their respective schools. Their progress is affected by culture, history, physical circumstances, heads' and teachers' thinking, so we cannot expect every school to adopt it in the same way and at the same pace. Furthermore, there are many variations in infrastructure, beliefs, usage and pedagogical use of IT across different special school types, due to the different needs of students with different types of disabilities. In other words, "one size cannot fit all."
- In the Special School Sector the curriculum itself, because it is different and unique, imposes problems with respect to delivery, availability of teaching materials etc. Special schools are also concerned with the development of social skills, self-care and communication as well as cognitive learning, and the role of IT may be different for each. Therefore there is a need to redefine the role of IT in serving different functions rather than just the perception of using it as a tool for cognitive learning.

12.1.4 School and wider community culture

- The government has done a lot in terms of making consistent provisions for each school, through designing initiatives, putting resources into schools, and teachers' training. But when we can see a lot of variation in the thinking within the school's own culture and the way these resources and provisions are put into use. In the next phase of the ITEd strategy it is important to look at how to cultivate the potential of individual schools. For different schools there will be different paths of growth and each should be allowed to pursue the introduction of ITEd in the way that is most appropriate for them.

12.1.5 Student learning

- It has emerged from the data that students' use of IT for learning outside school hours has a relationship with student learning outcomes. In this connection, what the teacher does with respect to developing activities that require students to make effective use of IT in meaningful learning tasks beyond the school context is of paramount importance. The implication of these findings is that student-centred learning is not necessarily defined as being only within the classroom setting.
- Learning is not a spectator sport (Chickering and Gamson, 1987) – learners have to do it in order to succeed at it – therefore it makes best sense to ensure students' access outside of school hours because students do not have a lot of opportunities to use IT in class anyway. This may be well the best strategy of ITEd in terms of pedagogy, since pedagogy is not focused exclusively on

what occurs in the classroom.

12.2 Recommendations and future directions

This section presents the recommendations for future directions that have arisen from this Study.

12.2.1 Policy

- Reconceptualisation of priorities in ITEd: The 5-year Strategy began with the introduction of the infrastructure followed by training then curriculum and pedagogies. However, teachers are still indicating relative discomfort with the curriculum and pedagogy aspects and this makes it clear that the benefits of IT do not happen automatically just because the technology has been provided. In the new plan, there is a need to focus on curriculum and pedagogy as a starting point. There is a corresponding need for professional development to support the pedagogy and curriculum goals, and infrastructure is needed to support the pedagogies.
- In addition, there is a need to move from one-size-fits-all ITEd initiatives uniform across schools to more flexible initiatives that allow school-based development according to context, stage of development and needs within a broad framework which defines and maintains a minimum standard with shared understanding of goals and objectives of ITEd.

12.2.2 Infrastructure

- There is a need to continue financing for ongoing upgrading and maintenance of the infrastructure. The Government probably still needs to be committed to giving this support. However, there has been some observation that a lot of principals and teachers are still thinking in terms of needing more computers. This mindset of ‘the more the better’ should be addressed because the upkeep/recurring cost is too high. Instead it is important to look at how to find a level/threshold of infrastructure and organization/distribution of IT facilities that is satisfactory but realistic to maintain but that also reduces the reasons teachers currently have for not using IT, such as not having access in the general classroom. It is also worth exploring other innovative setups and arrangements that enable more small-group collaborative learning which has been found to be the most effective way to use ITEd as a tool for learning. The importance of having at least some computers in classrooms to enable the curriculum to leverage the classroom use of computers has been particularly reiterated by the Overseas Consultants (Appendix VIII). Of course it is important to note that in exploring these setups it is necessary to achieve a balance between security needs and access needs.
- There is a need to explore ways to solicit community resources and support for ITEd initiatives, and to take full advantage of the phenomenon that most students have computers at home. The Overseas Consultants have emphasised that public policy ought to ensure alternative access for those students who do not have effective home access (Appendix VIII).
- There is a need to look seriously and actively at ways to facilitate more access for students to computers outside school hours and if necessary, to invest resources in this respect. There is also a need for teachers to plan specifically for home use of computers in order to bring about the most effective impacts. This recommendation was given particular emphasis by both the Review Team (Appendix IX) and the Overseas Consultants (Appendix VIII). According to the latter, at this stage the home appears to be an under-utilised resource for effective learning and they recommend that EMB should consider making it a priority to test new models of helping parents to help their children in this area.
- We suggest that there should continue to be some level of uniform pro-rata distribution of funding to schools, but in addition to this it may also be desirable to make available different allocations for different schools. For example, there is still a need to have some positive discrimination with respect to financial support, that is to support a few seed schools that have already shown they are capable of high levels of achievement so that they can be models for others. It is not necessary to expect every school to be the same but there should be provisions to monitor the same standard minimum requirement for all schools to reach. There should therefore

also be some provision to enable the 'weaker' schools to upgrade their development.

12.2.3 Teacher enablement/support

- There is definitely a need for ongoing professional development for teachers, not on the technical side of software use but more in terms of pedagogical use of IT in specific subject areas. The Review Team (Appendix IX) emphasised the challenge of providing professional development and support that focus on the pedagogical use of IT. One example is the South Korean model of teachers being expected to undertake IT training every three years. Another is the model used in Singapore, in which IT coaches from the Educational Technology division are sent to schools to train teachers in pedagogical principals. The Overseas Consultants (Appendix VIII) have recommended that, since teachers' ability to institute student-centred learning is very much dependent on the context in which they are working, it is important for future policy to take into account the extent to which current teaching embodies learner-centred ideas and the extent to which current teachers have the appropriate skills, regardless of whether or not these teaching practices and skills involve IT.
- Technical support and curriculum support in the preparation of teaching material is still much needed, a recommendation that has received endorsement from the Local Consultants (Appendix VII).
- There is still a need for the development of a shared understanding of the proper role of ITEd among school heads and teachers.
- A lot of teachers have expressed the need for continual professional development in ITEd, through sharing sessions within schools and among schools, particularly within subject groups, regarding effective IT use and good practice.
- Partnerships between tertiary institutions and schools need to be more systematic and structured rather than on an ad hoc basis. This is one of the recommendations emphasised by the Overseas Consultants (Appendix VIII).
- There is a need for IT resources and materials and there is little sense in this being done on a school-based level where teachers are duplicating efforts, but rather at a central level where materials are collected that can be accessed by teachers. However, development and support involve more than the idea of just providing a pool where everyone can contribute their materials. It is important to note that the provision of suitable resources and materials is only one step, and it is the whole pedagogical design that is important. It is also important to remain aware of the caution from the Overseas Consultants (Appendix VIII) that unless shared collections are supported by extensive, continuing efforts to maintain and expand them and promote their use, there is a danger of their either being used little or becoming storehouses of material that is not top quality and up-to-date.
- Teachers need some insights and experiences in terms of the whole strategy for teaching their particular subjects. There is a need to help teachers to understand the distinction between the different ways of using IT in teaching and learning, as described in the Literature Review (Chapter 2) and how to fully utilize them:
  - teaching with IT
  - learning from IT
  - learning the subject matter with IT.

  It is also important to emphasise that the objective of ITEd is to help students to make effective use of IT as a tool in their own learning, not just to help teachers to prepare suitable materials – so there is a need to develop ways to help teachers to acquire the skills to promote this kind of learning.

12.2.4 Curriculum and pedagogy

- Pedagogical use is a result of a combination of many factors therefore any attempt to change the pedagogical paradigm has to be seen in relationship to the whole examination system, curriculum etc. Hence the ITEd strategy should be fully integrated with the current processes of curriculum review/development.

- There is a need for greater understanding of how IT can best support various curriculum areas. This was one of the recommendations particularly noted by the Local Consultants Team (Appendix VII).
- Assessment – given the belief within the Hong Kong community regarding the importance of assessment – if we really want to use IT to promote student-centred learning the assessment has to be not limited to the current structure i.e. the paper-based closed-book written examination. There is a need to look at alternative forms of assessment that are more conducive to student-centred, IT-based activity.
- There is a need for clearer guidelines with respect to the teaching of IT itself and, in particular, to developing students' information and higher-order thinking skills.
- The need for consistency in future developments in ITEd in Hong Kong was recommended by the Overseas Consultants (Appendix VIII). They highlight that it is important to have consistent efforts to support generic IT-enabled learner-centred teaching across the board, since efforts would be wasted if there were other parts of EMB supporting curriculum reforms that do not match these goals.

12.2.5 Others

- It is important to focus on the quality rather than the quantity of use: not whether a teacher uses or does not use IT for a particular percentage of the time, but whether they use it in a quality way that enhances student learning.
- There is a need for further research and evaluation – but for this to be more focused on a particular strand of use of IT in different curriculum areas and its impact on student learning rather than general surveys. This research would most profitably take the form of coordinated school-based action research led by evaluation experts.
- The Overseas Consultants (Appendix VIII) raised the comment that, based on their experience elsewhere, it is likely that the average figures reported here may not be typical in that they may be affected by some outstanding schools with outstanding practices. They recommend further research, over time, about the factors that influence these "star" schools, particularly the coming and going of key individuals or whether such climates are relatively stable once established.

12.2.6 Specific recommendations for special schools

In addition to the recommendations included above, that are pertinent to all three school sectors, the following specific recommendations have been made for the Special School Sector.

- To provide individualized support of ITEd funding and resource to individual school types;
- To provide sufficient and cost-effective assistive devices to students for school and home computer uses;
- To customize staff development for special school teacher and therapists;
- To include teachers, therapists/specialists, parents, and students in planning and evaluating ITEd;
- To develop ITEd for students holistic development rather than focusing too much on academic teaching-learning;
- To encourage the ITEd users of same special school types (e.g., teachers, therapists, parents, etc.) to build on the apparent existing practice of peer sharing by forming consortiums for mutual expertise and resource support and pooling.
- To improve the community-wide infra-structure and culture to support special school students' ITEd access and usages.

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