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.