Centre for Information Technology in Education

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# Final Report on Phase (II) Study on Evaluating the Effectiveness of the 'Empowering Learning and Teaching with Information Technology' Strategy (2004/2007)

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## List of Symbols and Terms

**Statistical Symbols:**

| | |
|---|---|
| N | total number of valid responses |
| SD | standard deviation |
| Max | maximum value |
| Min | minimum value |
| df | degrees of freedom |
| r | Pearson product-moment correlation coefficient |
| Sig. | observed significance level |

**Terms:**

| | |
|---|---|
| ICT | "ICT" stands for "information communication technology". In this report, IT and ICT are interchangeable and carry the same meaning. |
| IL | Information literacy |
| ISP | Internet service provider |
| KLA | Key learning area |
| PA | Performance assessment |
| SITES | Second Information Technology in Education Studies |
| 7 IL Dimensions | "7 IL Dimensions" include the "Define", "Access", "Manage", "Integrate", "Create", "Communicate" and "Evaluate" dimensions. |
| 8 IL Indicators | "8 IL Indicators" include the "Define", "Access", "Manage", "Integrate", "Create", "Communicate" and "Evaluate" dimensions as well as the "Total Score". |
| Total Score | "Total Score" means the sum of respective scores of "Define", "Access", "Manage", "Integrate", "Create", "Communicate" and "Evaluate" dimensions. |
| Mean Score Percentage | Mean Score Percentage = (Mean score / Full score)*100% |
| School Types | The 3 "School Types" are primary, secondary and special schools. |

## Executive Summary

## 1 Purpose of the Study

The Education Bureau (EDB) of the Government of the Hong Kong Special Administrative Region (HKSAR) has commissioned the Centre for Information Technology in Education (CITE), the University of Hong Kong to conduct the "Phase (II) Study on Evaluating the Effectiveness of the 'Empowering Learning and Teaching with Information Technology' Strategy (2004/2007)" [Phase (II) Study] to evaluate the impact of Information Technology (IT) on students' learning in specific Key Learning Areas (KLAs) as well as for timely overall analysis of all relevant data collected within 2004/05 to 2006/07 school years for concluding the effectiveness of the Strategy based on the results of both Phase (II) Study and Phase (I) Study[1] and informing future policies. The overall objectives of the study are as follows:

- to evaluate the impact of IT on empowering students' learning in Chinese Language and Mathematics at primary school level as well as Chinese Language and Science at secondary school level and in special schools; and
- to conclude the overall effectiveness of the Strategy and to recommend the way forward for IT in Education (ITEd).

## 2 Methodology

Two types of instruments were specially designed for this study. The first type of instruments was the online performance assessments (PAs) on information literacy (IL) including Technical, primary Mathematics, Science, primary Chinese Language and secondary Chinese Language. The aims of these assessments were to find out students' level of proficiency in IL. The second type of instruments was the questionnaires including Student Questionnaire, Teacher Questionnaire, School Head Questionnaire and Information Technology Coordinator (ITC) Questionnaire. The aims of these questionnaires were to collect students' background information on using ICT[2] and information on factors at school level, such as school leadership, learning and teaching practices in using ICT in school as well as IT infrastructure and support, that would affect students' learning in using ICT.

In this study, the target population included primary 5 (P5) and secondary 2 (S2) students in the 2006/07 academic year and those teachers teaching the related subjects (Chinese Language and Mathematics at P5 level as well as Chinese Language and Science at S2 level) as well as school heads and IT coordinators (ITCs) in the sampled schools. 40 primary schools and 33 secondary

[1] The "Phase (I) Study on Evaluating the Effectiveness of the 'Empowering Learning and Teaching with Information Technology' Strategy (2004/2007) (the Strategy) " [Phase (I) Study] was also a study commissioned by the EDB (former Education and Manpower Bureau) to a local tertiary institution focusing on reviewing the progress of various ITEd initiatives as put forth in the Strategy.

[2] The terms ICT and IT are interchangeable which means information communication technology.

schools as well as 4 special schools took part in this study. The overall response rates were 26.85%, 23.57%, and 80% for the primary, secondary and special schools respectively. One intact class of the target grade level was sampled from each of the participating schools. The sample sizes, actual number of participants and response rates of the performance assessments and questionnaire surveys were summarized in the table below:

Table E1 Sample sizes, actual number of participants and response rates of performance assessments and questionnaire surveys

| **Instrument Type** | | **School Type** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Primary | | | Secondary | | | Special | | |
| | | Sample Size | Actual no. of participants | Response Rate (%) | Sample Size | Actual no. of participants | Response Rate (%) | Sample Size | Actual no. of participants | Response Rate (%) |
| Online Performance Assessments | | 1340 | 1320 | 98.51 | 1300 | 1302 | 100.15* | 41 | 35 | 85.37 |
| School Head Questionnaire | | 40 | 37 | 92.50 | 33 | 31 | 93.94 | 4 | 3 | 75.00 |
| ITC Questionnaire | | 40 | 38 | 95.00 | 33 | 33 | 100.00 | 4 | 4 | 100.00 |
| Student Questionnaire | | 1340 | 1227 | 91.57 | 1300 | 1234 | 94.92 | 41 | 33 | 80.49 |
| Teacher Questionnaire | Chinese Language Teachers | 42 | 41 | 97.62 | 39 | 35 | 89.74 | 6 | 3 | 50.00 |
| | Science Teachers | / | / | / | 35 | 34 | 97.14 | 4 | 3 | 75.00 |
| | Mathematics Teachers | 44 | 40 | 90.91 | / | / | / | / | / | / |

N.B. *The sampling was done in July 2006 and the PAs were conducted from December 2006 till early April 2007. There were students enrolled/dropped out in schools during that period of time. Therefore, the response rate exceeds 100% for the secondary schools.

# 3 Summary of Findings

## 3.1 Students' Achievements in Information Literacy

Student's performances in each PA will be summarized first. Then cross-schools analysis for each set of PA will be presented for primary and secondary schools separately. As only four special schools participated in this study, no further analysis was conducted across special schools.

Results from the Technical PA indicated that students in the primary, secondary and special schools had good performances in the dimensions of "define', "access" and "manage". On the other hand, poor performance was found in the dimensions of "communicate" and "create". Results showed that secondary school students had significantly better performance than that of the primary school students with respect to all IL indicators. Results also showed that there were significant differences across schools in terms of students' levels of IL competences in technical proficiency. For the primary school students, larger dispersion was found in the dimensions of "access" and "manage". For the secondary school students, larger dispersion was found in the dimension of "evaluate".

In Science PA, results from the PA indicated that students in both secondary schools and special schools had better performance in the "define" and "access" dimensions. Poor performance was found in the "integrate" and "evaluate" dimensions for both secondary and special school students. Results also showed that there were significant differences across secondary schools in terms of students' levels of IL competences in Science PA. Larger dispersion was found in the dimensions of "define", "access" and "integrate".

In Mathematics PA, regarding the 7 IL dimensions, better performances were found in "define" and "create" dimensions. Poor performances were found in "evaluate" and "integrate" dimensions. Results also showed that there were significant differences across primary schools in terms of students' levels of IL competences in Mathematics PA. It was also observed that smaller dispersion was found in the dimensions of "define" and "evaluate" and larger dispersion was noted in "access", "manage", "integrate" and "create" dimensions.

The overall performance of P5 students in Chinese Language PA was not very impressive. Students performed the best in the "define" dimension. Their performances were poor in the dimensions of "access", "communicate" and "evaluate". There were significant differences across the primary schools in terms of students' levels of IL competences in Chinese Language PA by ANOVA.

Students' overall performance in Chinese Language PA in the secondary schools was average. Secondary school students performed better in the dimensions of "manage", "define" and "access". The lowest performance was found in the dimension of "integrate", followed by "evaluate". There were significant differences across the secondary schools in terms of students' IL performance. For students in the special schools, the overall performance was not impressive. Special school students performed better in the "manage", "define" and "access" dimensions. The lowest performance was found in the "evaluate" dimension.

In sum, when examining the variability across schools, it was found that, in primary schools, larger dispersion was found in the "access" dimension for the 3 sets of PAs and smaller dispersion in the "define" dimension for both Mathematics and Chinese Language PAs. In secondary schools, larger dispersion was found in "access" and "integrate" dimensions for both Science and Chinese Language PAs. The dimension of "evaluate" was with smaller dispersion in secondary schools for both Chinese Language and Science PAs.

## 3.2 Relationship between Students' Information Literacy Competences in Specific Key Learning Areas and their Technical Proficiency

At primary school level, the correlations of students' technical proficiency and their IL competences in Chinese Language PA were stronger than those of their technical proficiency and IL competences in Mathematics PA. Among the one-to-one corresponding pairs of the 7 IL dimensions between Technical PA and primary Chinese Language PA, the correlation in the "manage" dimension was relatively stronger. The same was observed between the Technical PA and Mathematics PA. For the secondary school students, the correlations of their technical proficiency and their IL competences in Chinese Language PA were stronger than those of their technical proficiency and IL competences in Science PA. In both circumstances, the strongest correlation was observed in the "integrate" dimension.

## 3.3 Relationship between Students' Information Literacy Competences in Different Key Learning Areas

Significant correlations of the 8 corresponding pairs of IL indicators of primary Mathematics and Chinese Language PAs were noted except the pair of "evaluate". A strong correlation between the "total" score of IL competences in primary Mathematics and Chinese Language PAs was observed. In general, the correlations of the 8 corresponding pairs of IL indicators of Science and secondary Chinese Language PAs were weak. Positively significant correlations were found in "access", "manage", "integrate" and the "total" score. Also, the pair "communicate" was negatively and significantly correlated.

## 3.4 Interaction Effect of Any Two Dimensions of Technical Proficiency on Information Literacy Competences in Specific Key Learning Areas

There were 9 pairs of indicators in Technical PA that had interaction effect on Mathematics IL competences. It was revealed that among the 7 IL dimensions in Mathematics PA, "communicate" and "evaluate" were affected most by such interaction. In terms of the number of IL dimensions being affected, the interaction effect of "integrate" and "communicate" in technical proficiency had a broader impact on Science IL competences. The interaction of "define" and "communicate" in technical proficiency had a broader effect on primary Chinese Language IL competences. It was found that only three combinations ("integrate-access", "create-define" and "create-manage") of IL dimensions in Technical PA had effect on Chinese Language IL competences in the secondary schools.

## 3.5 Students' Competences in Information Literacy and their Background Factors

Some background factors collected in Student Questionnaire were used to explore whether there were any effects on the students' performance in assessments. As small amount of special school data were collected, special school students' data were excluded for such analysis.

**Gender**

With respect to the "total" score in IL, it was found that female students significantly outperformed the male students in primary Chinese Language and Technical PAs in both primary and secondary schools. While male students got significantly higher mean total score than that of female students in Science PA, there were insignificant differences in their performances in primary Mathematics and secondary Chinese Language PAs.

**Years of experience in using computer**

For Technical PA in primary schools, it was found that difference of years of experience in using computer had statistically significant effect on students' performance in "define", "integrate" and "manage" as well as in the "total" score. In secondary schools, statistically significant differences in the performance of students with various years of experience in using computer were found in the indicators of "define", "create", "evaluate" and "total" score. For Mathematics PA, students with 5 to 6 years of computer experience performed significantly better in the dimensions of "define", "access", "integrate" and "create" as well as the "total" score. For Science PA, students with various years of experience in using computers did not have much difference in their performance. In primary Chinese Language PA, only in the indicators of "manage", "integrate", "communicate", "create" and the "total" score were the differences significant among group means of students with different years of experience in using computers. For secondary Chinese Language PA, students who had used computers for 7 years or more performed significantly better than other groups of students with respect to all IL indicators except "define".

**Access to computers at home**

Those students who had computer access at home had significantly higher scores than those who did not in all the 8 IL indicators except "define" in primary Chinese Language PA as well as "define" and "evaluate" in secondary Chinese Language PA. However, the results of further analysis showed that it was only in a few IL dimensions in Technical PA for primary and secondary schools, Science PA and primary Mathematics PA that statistically significant differences were found in the mean scores of those students who had computer access at home and those who did not.

**Duration of daily computer use at home**

Although there was not much significant difference in the performance of students in relation to their durations of computer usage per day in the secondary Technical, Science and secondary Chinese Language PAs, significant differences in the mean scores were found between students who spent different amount of time in using computer at home per day in most IL indicators of the Technical, Mathematics and Chinese Language PAs in primary schools. In these three PAs, the mean scores of most IL indicators increased as the duration of computer usage increased up to the duration of 5 to 7 hours per day while a drop of performance was evident for students using computers more than 7 hours per day. Such findings might suggest that an excessive usage of computers at home did not have a positive impact on students' performance.

### 3.6 Students' Competences in Information Literacy and School Level Factors

Some school level factors were used to explore whether there were any effects on students' performance in assessments. As small amount of special school data were collected, special school students' data were excluded in such analysis.

**Ability grouping**

There were four ability groupings in primary schools, namely "high", "middle", "low" and "unclassified". In general, "high" ability grouping students of the primary schools had better results in Mathematics PA and the "unclassified group" had better performances in primary Technical and primary Chinese Language PAs.

There were three ability groupings "high", "middle" and "low" in secondary schools. It was interesting to find that for Science PA, the "middle" ability grouping students of the secondary schools performed better in all the 7 dimensions of IL except "integrate" and "create" (for "create", same score as the higher ability group) and higher ability groups performed better in "integrate". For Technical and Chinese Language PAs, secondary school students of "high" ability grouping performed significantly better in most of the IL dimensions.

**Medium of instruction**

For Technical PA, students of secondary schools using English as the medium of instruction (EMI) significantly outperformed those students of schools using Chinese as the medium of instruction (CMI) in the dimensions of "define" and "evaluate" as well as the "total" score. In Science PA, students from the CMI secondary schools performed significantly better in the dimensions of "define", "access", "communicate", "evaluate" as well as the "total" score when compared with EMI students. For Chinese Language PA, students of secondary schools using EMI significantly outperformed those students of schools using CMI in all 7 IL dimensions except "define".

**Operational session**

The related analysis was conducted in primary schools only. It was found that students studying in the AM sessions significantly outperformed the others in "access" and "manage" dimensions in Technical PA. For Mathematics PA, students studying in AM sessions performed significantly better in the "integrate" dimension. For Chinese Language PA, students studying in the AM sessions performed significantly better in the "define" dimension.

**School sex**

This analysis was conducted in secondary schools only. For Technical PA, students studying in girls' schools performed significantly better than the others in the "evaluate" dimension. Students in co-educational schools significantly outperformed the others in the "manage" dimension. Students in boys' schools performed better in the "define" dimension. In Science PA, it was found that students in boys' schools significantly outperformed the others in the dimensions of "define" and "integrate" as well as the "total" score. In the dimension of "communicate", students from both co-educational schools and boys' schools performed significantly better than those from girls' schools. Students from co-educational schools significantly outperformed the others in the dimension of "manage". In secondary Chinese Language PA, students in boys' schools performed significantly better in "define", "access", "communicate" and "evaluate" dimensions.

**School location**

For Science PA, secondary school students of schools located in the New Territories performed significantly better in the dimensions of "define", "access" and "manage" as well as the "total" score. For primary Technical PA, there was no statistically significant difference in students' IL performance with regard to school location. For the secondary schools, students of schools in the New Territories performed significantly better in the "manage" dimension than the others. For Mathematics PA, primary school students of schools on Hong Kong Island displayed significantly better results in the "integrate" dimension while students of schools located in Kowloon performed better in the "communicate" dimension. In primary Chinese Language PA, the location of schools did not have any impact on students' performance. For secondary Chinese Language PA, students of schools on Hong Kong Island significantly outperformed the others in the "define", "access" and "evaluate" dimensions as well as the "total" score.

## 3.7 Findings of Other Questionnaires

The major findings from the other three questionnaires, namely School Head Questionnaire, Teacher Questionnaire and ITC Questionnaire will be reported below.

**School Head Questionnaire**

Results from School Head Questionnaire indicated that schools heads from the primary, secondary and special schools alike considered using ICT in "traditionally important curriculum goals" such as achieving good examination results to be more important than using ICT in "emerging curriculum goals" which were related to lifelong learning, collaborative inquiry and strengthening of communication skills. School heads also reported that developing a common pedagogical vision among teaching staff in school was the foremost important competence at school leadership that school heads should acquire.

**Teacher Questionnaire**

Results from Teacher Questionnaire indicated that over 80% of both primary and secondary school teachers had used ICT to conduct learning and teaching activities. Teachers in the primary, secondary and special schools proclaimed that they were more competent in the "general use of ICT" than "pedagogical use of ICT". Teachers of all the three school types also expressed that for the orientation of teacher practices and student practices, they used ICT more often in “traditional practices” and less in “connectedness practices”.

**Information Technology Coordinator Questionnaire**

It was found that the more commonly available technology-related resources at the primary, secondary and special schools were “general office suite”, “mail account for teachers”, “communication software” and “multi-media production tool”. In addition, “equipment and hands-on material” was also commonly available at the secondary schools. Besides, the most extensive technical support available to teachers at the primary and secondary schools was for “assigning short-task projects in schools”. In addition, “introducing students to useful online language resources such as digital dictionaries and translation software” was another type of activity for which extensive support was available to teachers at the primary schools.

# 4 Conclusion

To conclude, as the EDB had already invested a huge amount of resources in ITEd, it was found that in general, students in primary, secondary and special schools attained the basic level in all the 7 IL dimensions and were rather weak in attaining higher level of proficiency which required higher-order and critical thinking skills.

For the overall effectiveness of the Strategy for ITEd, Phase (I) Study indicated that the implementation of the strategy was generally effectual. Similar findings were also observed in the questionnaire surveys in this study, such as teachers and students’ capability of using ICT for their teaching or learning. However, this study also revealed that there were still gaps and discrepancies among schools in terms of infrastructure and professional support. The use of ICT still focused on “traditional practices” and less in “lifelong practices” and “connectedness practices”. Besides, teachers were more competent in the general use of ICT than pedagogical use of ICT.

# 5 Major Recommendations

## 5.1 Ensuring Baseline Technology Access in Schools

In order to ensure that the schools have the baseline technology access for the implementation of any ICT in education strategy on learning and teaching, it may not be sufficient to provide schools with guidelines on ICT infrastructure only; instead, the HKSAR Government should establish a minimum standard in terms of ICT access, including the minimum standard and configurations for hardware, software and network infrastructure which form the baseline expectations for the development of e-learning curriculum resources and online assessment. Furthermore, the HKSAR Government should establish a mechanism to ensure that schools will make sure that their ICT infrastructure is not below the minimum standard.

In addition, it is important to note that there are guidelines for the employment of technical support staff but there is no enforcement mechanism to ensure to what extent such guidelines have been appropriately used by schools. It is suggested that the Government should establish a set of up-to-date benchmarks for testing the minimum expected knowledge and skills of school technicians.

### 5.2 Empowering Learners with IT

We recommend two major strategies to empower learners with IT. The first one is enhancing students' IL proficiency by encouraging students to make intelligent use of ICT in the project-based learning process, particularly in projects that provide opportunities to engage students in using ICT to solve ill-structured and authentic problems. Relevant learning activities should be organized so as to help students to develop the higher-order information literacy skills. Secondly, it is proposed that a well-articulated IL framework should be established in each KLA. It is recommended that for each KLA, a clear IL framework depicting the levels of achievements expected for the different IL dimensions of each key stage is needed.

### 5.3 Empowering Teachers with IT

To deepen teachers' understanding of IL, it is recommended firstly to develop pedagogical designs for implementing the IL framework in learning and teaching for different KLAs. This will help to ensure that teachers know how to incorporate the IL framework into their curriculum and assessment practices. Secondly, it is recommended that professional development opportunities should be provided to teachers on how to develop and use KLA-specific IL assessment tasks. The assessment tasks developed in this study can be used as exemplars in this regard. IL assessment tasks developed to provide broader curriculum coverage should be provided to teachers in the near future so that they can have an in-depth understanding and be able to facilitate and assess the development of IL in the subject areas they teach. Thirdly, it is also recommended that a renewed teachers' professional development framework should be put in place and related professional training programmes should be developed for the implementation of the new teachers' framework, so as to ensure that such implementation will be KLA-specific and inline with the students' IL framework.

### 5.4 Enhancing School Leadership for the Knowledge Age

To enhance school leadership capacity to support efforts to develop students' IL proficiency and the implementation of IL assessment in schools, it is recommended that leadership programmes should be provided to school heads to heighten their awareness of these issues. Furthermore, it is necessary to provide them with knowledge and skills to develop school-based IT strategic plans to enhance learning and teaching, and in particular, the generic and KLA-specific IL proficiency of students.

Besides, school heads should be provided with professional/leadership development opportunities to gain a deeper understanding of IL- and the KLA-specific nature aspects of IL competences. It is also recommended that school heads should appoint the person in charge of the overall curriculum development in school to coordinate different panels in the identification of the technical IL competences required to support the IL components in various subject curricula for each grade level, and to develop a coordinated approach to ensure that there will not be gaps or significant overlaps in the IL-related curriculum in the different subject areas within and across grade levels.

### 5.5 Enriching Digital Resources for Learning

It is recommended that key tools and resources for each KLA be identified and professional development opportunities be provided to introduce these to teachers in the relevant KLAs. Strategies should also be in place to ensure that the aforementioned kinds of digital resources can be effectively identified and introduced to teachers in meaningful pedagogical contexts.

### 5.6 Improving IT Infrastructure and Pioneering Pedagogy using IT

To improve IT infrastructure and support innovative pedagogies using IT, it is suggested that mechanisms should be built to ensure continual update of the minimum standards for ICT infrastructure and basic benchmark for technical support expertise in schools and mechanisms be put in place to support innovative teachers to form cross-school communities of practices to pioneer new pedagogies and support these pioneering teachers to play mentoring roles in the dissemination of innovative practices.

### 5.7 Providing Continuous Research and Development

It is recommended that the EDB can further initiate and commission research and development projects in extending the current study to other KLAs and grade levels and to put in place measures to identify and disseminate pedagogical strategies that will effectively enhance students' higher-level IL competences in different KLAs and also research on medium of instruction and development of students' IL competences.

### 5.8 Promoting Community-wide Support and Community Building

To seek support from parents for IT in education implementation, it is recommended that education programmes for parents should be provided so as to help them gain a better understanding of IL and the impact of IT on students' learning. Such programmes may be organized through parent-teacher associations, non-governmental organizations and the EDB.

# Chapter 1 Background of the Study

## 1.1 Introduction

The former Education and Manpower Bureau (EMB) [now the Education Bureau] of the Government of the Hong Kong Special Administrative Region launched the "Empowering Learning and Teaching with Information Technology" Strategy (the Strategy) in July 2004. Amongst the seven strategic goals as stipulated in the policy document, research that provides feedback 'on the effectiveness of the IT in education strategy and the impact of IT on students' learning outcomes' has been spelt out under "Goal 6: Providing Continuous Research and Development". In this respect, regular surveys where appropriate will be conducted so as to monitor and evaluate strategy implementation. To achieve Goal 6, the EMB has commissioned the Centre for Information Technology in Education (CITE), the University of Hong Kong to conduct the "Phase (II) Study on Evaluating the Effectiveness of the 'Empowering Learning and Teaching with Information Technology' Strategy (2004/2007)" [Phase (II) Study].

It is planned that this Phase (II) Study should focus on evaluating the impact of Information Technology (IT) on students' learning outcomes in specific Key Learning Areas (KLAs) and for timely overall analysis of all relevant data collected within 2004/05 to 2006/07 school years for concluding the effectiveness of the Strategy and informing future policies.

## 1.2 Study Objectives

The core component of this study is a set of performance assessments to provide evidence on the IT proficiency (i.e. technical proficiency) of primary, secondary and special school students as well as their ability to access, evaluate, and reason with information; collect, analyze and interpret data, and to communicate and collaborate in the context of learning tasks in specific KLAs making appropriate use of IT. The overall objectives of the study are as follows:

- to evaluate the impact of IT on empowering students’ learning in Chinese and Mathematics at primary school level as well as Chinese and Science at secondary school level and in special schools; and
- to conclude the overall effectiveness of the Strategy and to recommend the way forward for IT in Education (ITEd).

The specific objectives of the study are as follows:

(a) to propose the methodology to investigate the impact of IT on empowering students’ learning in Chinese and Mathematics KLAs for the primary, and Chinese and Science KLAs for the secondary and special school sectors as well as to evaluate the effectiveness of the Strategy with respect to the data garnered in relation to the implementation measures of the 7 strategic goals;

(b) to develop instruments with respect to the nature of the Study and the target stakeholder groups, in particular teachers and students of the primary, secondary and special school sectors;

(c) to propose respective sampling methods and sampling schemes of target stakeholders in each school sector (i.e. primary, secondary and special) as well as other community groups / organisations (if applicable) and to conduct the data collection based on 1.2 (a) and 1.2 (b) above;

(d) to establish a framework to store and maintain the collected data systematically into the data bank which has been developed in accordance with the knowledge management framework of the "Phase (I) Study on Evaluating the Effectiveness of the 'Empowering Learning and Teaching with Information Technology' Strategy (2004/2007)" [Phase (I) Study][1]; and

(e) to conclude the effectiveness of the Strategy based on the results of both Phase (I) Study and Phase (II) Study, and to recommend necessary adjustments to the implementation of the ITEd projects as well as the way forward for ITEd.

## 1.3 Research Questions

The following specific research questions are addressed in this study:

1. What levels of technical proficiency have students achieved in the use of IT tools for general applications and communication? Are there significant differences across schools and across education levels?
2. What levels of information literacy (IL) competence have students achieved in Chinese Language[2]? Are there significant differences across schools?
3. What levels of IL competence have students achieved in Mathematics? Are there significant differences across schools?
4. What levels of IL competence have students achieved in Science? Are there significant differences across schools?
5. What relationships, if any, can be found between students' IL competences in specific KLAs and their technical proficiency?
6. Are there any relationships between students' IL competences in different KLAs?
7. Are there interaction effects in the relationship between technical proficiency, and students' IL competences in specific KLAs?
8. What relationships, if any, can be found between the following school level factors (which are associated with the ITEd strategic goals) and students' technical proficiency and IL

[1] The "Phase (I) Study on Evaluating the Effectiveness of the 'Empowering Learning and Teaching with Information Technology' Strategy (2004/2007)" was also a study commissioned by the EDB (former Education and Manpower Bureau) to a local tertiary institution focusing on reviewing the progress of various ITEd initiatives as put forth in the Strategy.

[2] The terms "Chinese Language" and "Chinese" are interchangeable. To be exact, Chinese is the subject and Chinese Language Education refers to the key learning area.

proficiency: school leadership, improving IT infrastructure and pioneering pedagogy, teachers' pedagogical practices with IT as well as teachers' IT competence and perception of ITEd?

## 1.4 Linkage with Phase (I) Study

When designing the questionnaires in this study, the Project Team has made reference to the instruments of Phase (I) Study. Relevant details are described in Chapter 2. In addition, recommendations in Phase (II) Study will be made with reference to related findings of Phase (I) Study.

# Chapter 2 Conceptual Framework and Methodology

## 2.1 Conceptual Framework

Learning is primarily a constructive process involving interactions of the learner with teachers, co-learners, learning resources, and possibly others that students may come into contact with during the learning process. IT can be used as a productivity tool, a cognitive tool, a communication or community building tool to support learning within and outside the classroom. In addressing the project aims, an ICT[3] literacy and curriculum framework as shown in Figure 2.1 is adopted for conceptualizing the impact of IT on students' learning in the identified KLAs and to evaluate the effectiveness of the Strategy with respect to the data garnered in relation to the implementation measures of information technology in education.

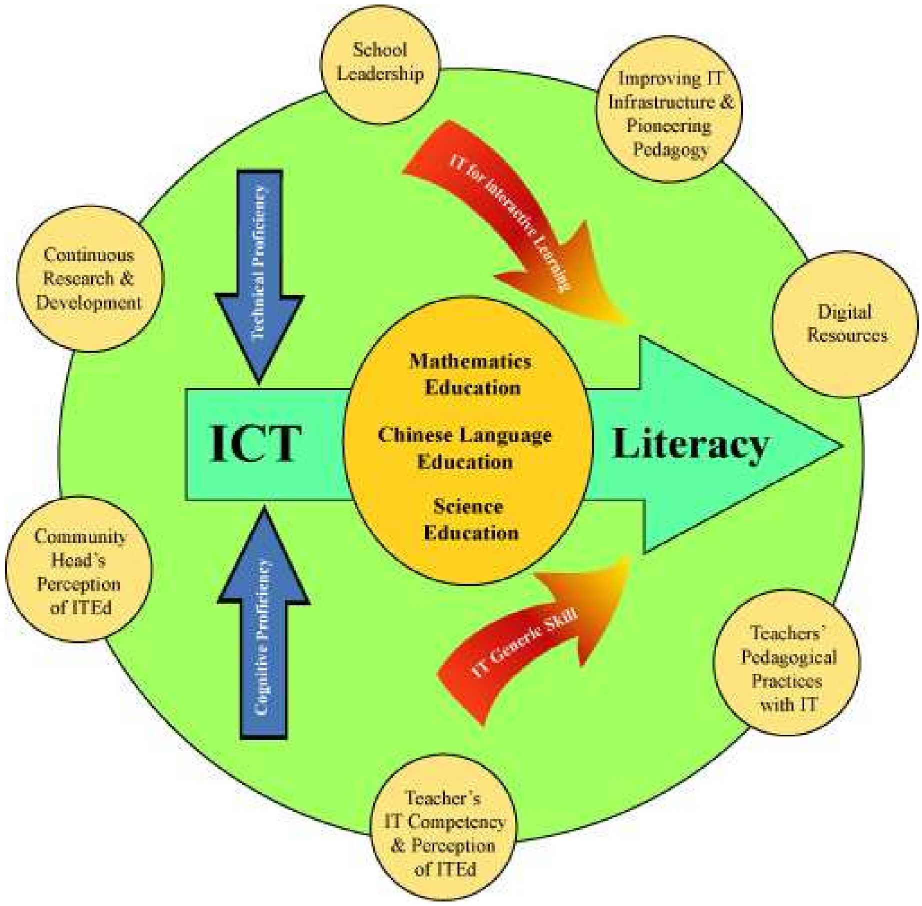



*Figure 2.1 Diagram showing the relationship amongst ICT literacy, learning in the KLAs and factors affecting the use of ICT*

In this framework, ICT literacy is not the same as technical competence. In other words, just being technologically confident does not automatically lead to critical and skillful use of information. Technical know-how by itself is inadequate; individuals must possess the cognitive skills needed to identify and address various information needs and problems. In Figure 2.1, it is clearly shown that in this framework, ICT literacy includes both cognitive and technical proficiency. Cognitive

3 The terms ICT and IT are interchangeable which means information communication technology.

Proficiency refers to the desired foundational skills of everyday life at school, at home, and at work. Literacy, numeracy, problem-solving, and spatial/visual literacy demonstrate these proficiencies. Technical Proficiency refers to the basic components of information literacy. It includes foundational knowledge of hardware, software applications, networks, and elements of digital technology.

The document *Learning to Learn: the Way Forward in Curriculum Development* published by the Curriculum Development Council in June 2001, which acts as the basis for the curriculum reform efforts currently underway in Hong Kong, specifies that the overarching principle for the reform is to "help students Learn to Learn, which involves developing their independent learning capabilities leading to whole-person development and life-long learning" (p. 10). It recommends that learning and teaching in the eight KLAs should aim not only to bring about knowledge and understanding in the requisite subject matter, but very importantly the development of nine generic skills, as these are fundamental in helping students to learn to acquire, construct and apply knowledge to solve new problems. One of the nine generic skills is information technology skills. Furthermore, the same document recommends teachers to make use of four key tasks to "help students develop independent learning capabilities through KLAs and across KLAs more readily" (p. 83). One of these four key tasks is IT for interactive learning. This key task plays an important role in supporting the achievement of the curriculum reform goals through helping students to develop the requisite IL competences. Some of the mechanisms for the development of information literacy competence through the use of IT for interactive learning are spelt out in the Learning to Learn curriculum reform document (p. 88):

- Providing audio / visual aids for difficult concepts;
- Searching for information from various sources and handling large quantities of information;
- Interaction between the learners, resources and teachers;
- Collaboration between learners and teachers; and
- Facilitating the acquisition of information, the development of critical thinking and knowledge building.

In addition, factors that would have impact on students' use of ICT in their learning are presented in the outermost layer in Figure 2.1. These factors are related to the 7 strategic goals in ITEd. One of the objectives in this study is to evaluate the impact of IT on empowering students' learning in Chinese and Mathematics at primary school level as well as Chinese and Science at secondary school level and in special schools which is directly addressing the first strategic goal "empowering learners with IT" in the Strategy. As can be seen in Figure 2.1, the two factors "teachers' pedagogical practices with IT" and "teachers' IT competency and perceptions of ITEd" are exploring issues concerning the second strategic goal "empowering teachers with IT". The "school leadership" factor is related to the third strategic goal "enhancing school leadership for the knowledge age". The factors "digital resources" and "improving IT infrastructure and pioneering pedagogy" are related to goals 4 and 5 of the Strategy respectively. Besides, the study itself is a research project on ITEd which will contribute knowledge and experience on the effectiveness of the Strategy as well as impact of IT on students' learning outcomes. In other words, strategic goal 6 "providing continuous research and development" will be emphasized. Finally, the factor on "community head's perception of ITEd" will provide useful information on the seventh strategic goal "promoting community-wide support and community building".

It is also believed that ICT literacy is an essential competence which should be integrated into different KLAs. Three KLAs namely, Chinese Language Education, Mathematics Education and Science Education will be included in this study. To conclude, information literacy is an important dimension in the learning outcomes arising from student learning in all KLAs and this dimension is important to the preparation of students' life-long learning abilities.

## 2.2 Defining Information Literacy

There is a proliferation of literature on information literacy (IL). According to Kuhlthau's (1987, p. 2) definition, IL is, by nature, a form of technical literacy. It includes the ability to read and use information that is essential for everyday life, recognize information needs and seek information to make informed decisions.

However, in the knowledge society, only acquiring technical literacy is not enough. A much broader range of abilities than technical skills is required. In the feasibility study for the PISA (Programme for International Student Assessment) IT literacy assessment report, the Organisation for Economic Cooperation and Development (OECD) (2003) defines IT literacy as

> '*the interest, attitude and ability of individuals to appropriately use digital technology and communication tools to access, manage, integrate and evaluate information, construct new knowledge and communicate with others in order to participate effectively in society.' (p. 8)*

In this study, the OECD's definition of IL is adopted.

## 2.3 Instrumentation

### 2.3.1 Developing Indicators for Evaluating Information Literacy

In considering appropriate indicators for evaluating the impact of ICT on specific KLAs, several major frameworks developed in different countries for the assessment of ICT literacy have been carefully reviewed. These include "Information Literacy Framework for Hong Kong: building the capability of learning to learn in the information age - Information Literacy Framework for Hong Kong Students" (EMB, 2005) in Hong Kong, "Digital transformation: A framework for ICT

Literacy” (ETS, 2002) in the United States and “National Survey of Information and Communications Technology Literacy” (MCEETYA, 2005) in Australia. On the basis of the review, it is found that the framework developed by ETS will be the most amenable for operationalization into assessment instruments with corresponding indicators for the current study. Table 2.1 presents the details of the seven dimensions of IL competence.

*Table 2.1 Dimensions of IL in this study*

| | |
|---|---|
| Define | Using ICT tools to identify and appropriately represent information needs |
| Access | Collecting and / or retrieving information in digital environments |
| Manage | Using ICT tools to apply an existing organisational or classification scheme for information |
| Integrate | Interpreting and representing information, such as by using ICT tools to synthesize, summarize, compare and contrast information from multiple sources |
| Create | Adapting, applying, designing or inventing information in ICT environments |
| Communicate | Communicating information properly in its context (audience and media) in ICT environments |
| Evaluate | Judging the degree to which information satisfies the needs of the task in ICT environments, including determining authority, bias and timeliness of materials |

Each dimension is further elaborated to identify different levels of observable performance. An IL framework with 4 levels of performance ranging from Novice to Advanced has thus been developed (see Appendix 2.1 for details) by the Project Team. This framework can be used to guide the development of subject-specific IL indicators and corresponding assessment tasks in the performance assessments (PAs) across the various KLAs.

### 2.3.2 Developing an Online Assessment Platform

There is a need to ensure that students in all schools can have access to a uniform computing environment for the valid comparison of achievement in performance tasks involving the use of ICT. This is thus a major challenge for the Project Team. (The lack of a uniform technology platform is also posing serious challenges to the introduction of online learning environments to schools.) The assumption of a computer platform that is generic enough to ensure that the educational applications designed can actually be installed in all schools is virtually impossible because of the complexity and diversity of ICT infrastructure in local schools. This problem is further aggravated by the lack of technical expertise in some schools such that there are often a lot of restrictions imposed on the functionalities available to students such as disabling the right-click key which will make some educational applications non-operable, and the absence of common plug-ins and applications such as Active-X and Java runtime engines so that many educational applications cannot be executed. In addition, many technical assistants are not able to troubleshoot to identify problems when difficulties occur.

The need for uniformity is particularly acute in the case of assessing students’ task performance using a variety of digital tools. Without a uniform technology platform in terms of the network connections and tools available, it is not possible to conduct fair assessment of students' performance, a task which is becoming increasingly important so as to provide authentic assessment of students' ability to perform tasks in different subject areas that can make use of digital technology.

In order to solve this problem, the Project Team has conducted much exploration and finally decided on the use of a remote server system - the Microsoft Windows Terminal Server (WTS). This requires the computers in participating schools to be only used as thin clients, i.e. dumb terminals, during the assessment process. It provides a unique and identical Windows' environment for every single user. Every computer in each participating school can log into the system and be used in the same way. In short, all the operations are independent for each client user and functionalities are managed from the server operating system. Students and teachers can take part in learning sessions, surveys or assessments at anytime and anywhere without worrying about the configurations of the computers which they work from. In addition to independent self-learning, collaborative learning with discussion can also be conducted within the WTS.

### 2.3.3 Developing Online Performance Assessment Tasks

#### *2.3.3.1 An overview*

A total of 5 sets of performance assessment (PA) tasks, answering keys and scoring rubrics are developed for this project. They are:

1. PA Tasks, Answering Keys and Scoring Rubrics on IL – Technical (Primary 5 & Secondary 2) in Appendix 2.2
2. PA Tasks, Answering Keys and Scoring Rubrics on IL – Mathematics (Primary 5) in Appendix 2.3
3. PA Tasks, Answering Keys and Scoring Rubrics on IL – Science (Secondary 2) in Appendix 2.4
4. PA Tasks, Answering Keys and Scoring Rubrics on IL – Chinese Language (Primary 5) in Appendix 2.5
5. PA Tasks, Answering Keys and Scoring Rubrics on IL – Chinese Language (Secondary 2) in Appendix 2.6

Each set of the PAs is designed according to the following criteria:

- The scenarios designed for each PA are authentic to students' daily life experiences.
- All the PAs are designed in line with the curriculum and respective grade levels. However, the same Technical PA is used at both primary and secondary levels based on the assumption that levels of technical literacy may not be bounded by school levels.
- The duration for each PA is 45 minutes.
- The full score for each PA is 50.

- The score for each question in each PA is approximately proportional to the time allocation.
- Each PA includes tasks with regard to the seven dimensions of IL. However, the levels of achievement for each dimension and the number of tasks in each dimension vary across different subject disciplines with respect to their subject nature.
- For each PA, general guidelines will be given at the beginning of the assessment to the students for answering the questions. Besides, the approximate completion time for each main question is indicated at the end of the question in each PA.

Finally, scoring rubrics together with students' sample work for each PA have been developed. The score and item allocation in each PA is presented in Table 2.2. For each set of scoring rubrics, four levels of students' achievements in each IL dimension are rated. The four levels are novice, basic, proficient and advanced. Each question has been indicated with the expected highest score that students may achieve.

*Table 2.2 Score and item allocation in each PA*

| IL Rubrics & Levels / Total No. of Questions / Scores | Define | | | | | Access | | | | | Manage | | | | | Integrate | | | | | Create | | | | | Evaluate | | | | | Communicate | | | | | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Novice | Basic | Proficient | Advanced | Total | Novice | Basic | Proficient | Advanced | Total | Novice | Basic | Proficient | Advanced | Total | Novice | Basic | Proficient | Advanced | Total | Novice | Basic | Proficient | Advanced | Total | Novice | Basic | Proficient | Advanced | Total | Novice | Basic | Proficient | Advanced | Total | |
| **Technical** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total No. of Questions | | | | | **1** | | | | | **4** | | | | | **2** | | | | | **1** | | | | | **2** | | | | | **3** | | | | | **1** | |
| Total Scores | 0 | 0 | 0 | 3 | **3** | 0 | 1 | 2 | 6 | **9** | 0 | 2 | 0 | 6 | **8** | 0 | 0 | 0 | 6 | **6** | 0 | 0 | 0 | 9 | **9** | 0 | 0 | 0 | 12 | **12** | 0 | 0 | 0 | 3 | **3** | **50** |
| **Mathematics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total No. of Questions | | | | | **1** | | | | | **4** | | | | | **4** | | | | | **5** | | | | | **2** | | | | | **1** | | | | | **1** | |
| Total Scores | 0 | 0 | 0 | 3 | **3** | 0 | 1 | 2 | 6 | **9** | 0 | 2 | 4 | 3 | **9** | 0 | 2 | 0 | 12 | **14** | 0 | 8 | 0 | 0 | **8** | 0 | 4 | 0 | 0 | **4** | 0 | 0 | 0 | 3 | **3** | **50** |
| **Chinese Language (P5)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total No. of Questions | | | | | **1** | | | | | **2** | | | | | **2** | | | | | **2** | | | | | **2** | | | | | **1** | | | | | **1** | |
| Total Scores | 0 | 0 | 0 | 3 | **3** | 0 | 0 | 0 | 14 | **14** | 0 | 2 | 4 | 0 | **6** | 0 | 0 | 4 | 3 | **7** | 0 | 0 | 2 | 5 | **7** | 0 | 0 | 0 | 6 | **6** | 0 | 1 | 6 | 0 | **7** | **50** |
| **Chinese Language (S2)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total No. of Questions | | | | | **1** | | | | | **3** | | | | | **2** | | | | | **2** | | | | | **2** | | | | | **1** | | | | | **1** | |
| Total Scores | 0 | 0 | 2 | 0 | **2** | 0 | 0 | 6 | 6 | **12** | 0 | 3 | 2 | 4 | **9** | 0 | 0 | 6 | 4 | **10** | 0 | 0 | 2 | 4 | **6** | 0 | 0 | 0 | 6 | **6** | 0 | 3 | 2 | 0 | **5** | **50** |
| **Science** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total No. of Questions | | | | | **3** | | | | | **2** | | | | | **3** | | | | | **5** | | | | | **1** | | | | | **2** | | | | | **1** | |
| Total Scores | 0 | 0 | 0 | 9 | **9** | 0 | 0 | 0 | 6 | **6** | 0 | 2 | 0 | 6 | **8** | 0 | 0 | 0 | 15 | **15** | 0 | 0 | 0 | 3 | **3** | 0 | 0 | 0 | 6 | **6** | 0 | 0 | 0 | 3 | **3** | **50** |

#### *2.3.3.2 Performance Assessment on Information Literacy – Technical (Primary 5 & Secondary 2)*

For technical literacy, the scenario is planning a trip for grandfather and grandmother to visit Hong Kong. Students need to finish a total of four questions within 45 minutes in the PA. Appendix 2.2 shows the details of the PA and the scoring rubrics. The same PA is used at both primary and secondary levels. The rationale for using the same PA is based on the assumption that levels of technical literacy may not be bounded by school levels.

#### *2.3.3.3 Performance Assessment on Information Literacy – Mathematics (Primary 5)*

For Mathematics, the scenario is a visit to the Ocean Park. The subject contents involving learning dimensions on Number, Measures, Data Handling as well as Shape and Space are included in the 1st Pre-pilot Study. However, after the pre-pilot and the pilot studies, it is found that due to the time limitation and students' weak performance on Data Handling, it is decided not to include questions in the Data Handling dimension. Therefore, only the Number, Measures as well as Shape and Space dimensions are included in the PA and students need to finish a total of six questions within 45 minutes. Appendix 2.3 shows the details of the PA and the scoring rubrics.

#### *2.3.3.4 Performance Assessment on Information Literacy – Science (Secondary 2)*

For Science, the scenario is a visit to the Kadoorie Farm. The subject contents included the learning units 2 (Looking at living things) and 7 (Living things and air) in the science curriculum in secondary 2. Students need to finish a total of seven main questions within 45 minutes in the PA. Appendix 2.4 shows the details of the PA and the scoring rubrics.

#### *2.3.3.5 Performance Assessment on Information Literacy – Chinese Language (Primary 5 & Secondary 2)*

Students learn Chinese Language with regard to 'reading', 'writing', 'listening' and 'speaking' dimensions. Compared to 'reading' and 'writing', 'listening' and "speaking" are less practical to be included in this IT-related PA given the constraints in many school computer room settings. Therefore, only 'reading' and 'writing' dimensions are included in the PAs for both primary and secondary levels. There are four questions in the primary 5 (P5) PA and the scenario is the Chung Yeung Festival. There are five questions in the secondary 2 (S2) PA and the scenario is about idioms and allusions. Appendices 2.5 and 2.6 show the details of the PAs and respective scoring rubrics at the primary and secondary levels.

### 2.3.4 The Survey Component

#### *2.3.4.1 An Overview*

The interest in finding out the impact of IT on students' learning in specific KLAs is not only an end in itself, but is also providing a key benchmark for evaluating effectiveness of the

Strategy. Therefore, in addition to the PAs, the study has to examine relationships amongst important indicators for the strategic ITEd goals at the school level such as curriculum goal in using ICT, resource allocation, teachers' practices and students' practices as well as the technical proficiency and IL competence outcomes in specific KLAs.

Four survey questionnaires, namely Student Questionnaire (Appendix 2.7), Teacher Questionnaire (Appendix 2.8), School Head Questionnaire (Appendix 2.9) and Information Technology Coordinator (ITC) Questionnaire (Appendix 2.10), were administered to provide indicators on students' background and their usage of ICT for learning, school leadership, IT infrastructure and support measures for pioneering pedagogy in the schools from which the participating students were sampled, as well as the pedagogical practices, the IT competence and perception of the roles and usage of IT for the teachers teaching the sampled students in the KLAs in which the students' IL competence was measured. Before designing the questionnaires, the Project Team had reviewed those questionnaires in Phase (I) Study, to make sure that there was no replicated data collected in Phase (II) Study.

The Student Questionnaire was specifically designed for the purpose of this study to provide information on students' background as well as some data related to the first and second strategic ITEd goals, "empowering learners with IT" and "empowering teachers with IT". For the other three questionnaires, the respective questionnaires designed for the SITES[3] 2006 study were adopted for this study. SITES 2006 was an international comparative study conducted under the auspices of the International Association for the Evaluation of Educational Achievement (IEA). The aims of SITES 2006 were precisely to find out the extent to which ICT was used in education, how it was used and how it supported and enhanced pedagogical practices. SITES 2006 comprised two survey components: a survey of schools (including School Head Questionnaire and ITC Questionnaire) and a survey of Mathematics and Science teachers of students in their eighth year (secondary 2) of schooling. Detailed design of each questionnaire will be elaborated in the following sections.

For this study, School Head Questionnaire, Teacher Questionnaire, ITC Questionnaire and Student Questionnaire, were set for the primary and secondary (for both secondary and special schools) levels. Some of the question items were modified with respect to the school level and subjects.

#### *2.3.4.2 Student Questionnaire*

The purpose of Student Questionnaire was to collect students' background information on using computer in their learning. Students were required to complete an online questionnaire in about 30 minutes.

[3] Second Information Technology in Education Studies

There were 31 questions covering various aspects of the students in primary 5: Information about You, The Use of Computer in School, About Your Mathematics Lessons and About Your Chinese Lessons.

There were 31 questions covering various aspects of the students in secondary 2: Information about You, The Use of Computer in School, About Your Science Lessons (secondary) and About Your Chinese Lessons (secondary).

Appendix 2.11 shows the details of the indicators in this questionnaire.

#### *2.3.4.3 Teacher Questionnaire*

The aim of Teacher Questionnaire was to collect information on the usage of ICT for learning and teaching from teacher's perspective. It was assumed that teachers would take approximately 30 minutes to complete this questionnaire.

There were 39 questions covering the following aspects (for both primary and secondary levels): Information about the Target Class, Curriculum Goals, Teacher Practice, Student Practice, Learning Resources and Tools, Impact of ICT Use, Information about You and Your School as well as Specific Pedagogical Practice that Uses ICT. Appendix 2.12 shows the details of the indicators in this questionnaire.

#### *2.3.4.4 School Head Questionnaire*

School Head Questionnaire aimed at collecting information on policy matters related to pedagogical practices, infrastructure and support as well as school leadership in ITEd. It was assumed that school heads would take approximately 30 minutes to complete this questionnaire.

There were 30 questions covering the following aspects: Pedagogy at Your School, Pedagogy and ICT in Your School, Staff Development for Teachers and the School Leadership, Pedagogical Support for Persons Using ICT, Obstacles, Organisation of Learning, School Characteristics and Personal Background Information. Appendix 2.13 shows the details of the indicators in this questionnaire.

#### *2.3.4.5 ITC Questionnaire*

The aim of ITC Questionnaire was to collect information on the resources and support in schools. It was assumed that ICT coordinators would take approximately 30 minutes to complete this questionnaire.

There were 19 questions covering the following aspects: ICT in Your School, Resource Materials and Hardware, Staff Development, Support Facilities for ICT and Obstacles.

Appendix 2.14 shows the details of the indicators in this questionnaire.

## 2.4 Administration

There were three main stages in this project. Stages one and two were the Pre-pilot Study and Pilot Study respectively. Stage three was the Main Study.

### 2.4.1 Pre-pilot Study

The aim of the Pre-pilot Study was to ensure validity of the instruments. The pre-pilot of the Student Questionnaire survey was conducted in two primary schools and two secondary schools in late May 2006. The 1st Pre-pilot Study of the PAs for technical literacy as well as IL of Science, Chinese Language and Mathematics were conducted in 4 secondary schools and three primary schools from late June 2006 to early July 2006. In order to ensure the quality of the PA tasks, the 2nd Pre-pilot Study on the 5 sets of revised PA tasks was conducted in 3 primary schools and 2 secondary schools around mid-September 2006. A school visit was conducted before the Pre-pilot Study in each participating school for system checking. The Project Team had made extensive observations during the Pre-pilot Study. After the completion of the pre-pilot, a follow-up focus group interview with some of the randomly selected students was held to solicit their views on difficulties in completing the questionnaire as well as technical problems encountered during the PAs.

A website (with the URL: http://ts.cite.hku.hk/instruction) clearly providing instructions on the technical set-up for accessing the CITE remote desktop was created in mid-June 2006 for the pre-pilot in schools. The Project Team asked the pre-pilot schools to follow these instructions to set up their computers for use in the pre-pilot.

### 2.4.2 Pilot Study

To ensure that instruments could fully address the objectives of the study, a Pilot Study was conducted in 5 primary schools and 6 secondary schools from October to early November 2006. The aim of the Pilot Study was to validate 5 sets of PAs and the Student Questionnaire as well as to rehearse related logistic arrangements of the Main Study. Similar to Pre-pilot Study, a website (with the URL: http://ts.cite.hku.hk/instruction) clearly providing instructions on the technical set-up for accessing the CITE remote desktop was created. The Project Team asked the pilot schools to follow these instructions to set up their computers for use in the pilot.

Before the PAs, students were divided into three groups. Each group of students was given two sets of PAs and a Student Questionnaire to be completed within 2 hours and 15 minutes.

### 2.4.3 Main Study

The Main Study was conducted from December 2006 to early April 2007. Letters (including the letters to the School Head, School Coordinator, Subject Teachers and ITC) informing the participating schools of the detailed logistic arrangements and instructions for system set-up for the Main Study were sent out in early November 2006.

Training for the invigilators of the Main Study was conducted in late November 2006. Invigilators were required to go through the 'Handbook for the Invigilators' in details. There were at least two invigilators to conduct the data collection in each of the sampled schools. An online calendar was set up for both the Project Team and the EMB to access and update the Main Study schedule more easily in early November 2006. In order to ensure that the same instructions were given to the students in each school, the chief invigilators were requested to give a short briefing according to the instruction PowerPoint.

Two sets of students' login were created for each school. One would be for normal use and another would be reserved for back-up. After the assessments, invigilators were required to submit their invigilators' reports within 2 working days.

During the Main Study, schools reflected that it was difficult for them to arrange a 2 hours 15 minutes time slot for conducting the PAs. Therefore, some schools had conducted the Main Study in 2 to 3 days. Table 2.3 shows the details.

*Table 2.3 Number of schools by duration needed for completing the Main Study by School Type*

| **School Type** | **No. of schools conducted the Main Study** | | | |
|---|---|---|---|---|
| | In 1 day | In 2 days | In 3 days | Total |
| **Primary** | 33 | 6 | 1 | 40 |
| **Secondary** | 26 | 7 | 0 | 33 |
| **Special** | 3 | 1 | 0 | 4 |

## 2.5 Data Analysis Method

In order to answer the eight research questions, data were collected from two main sources. They were the 5 sets of PAs and 4 sets of questionnaires. In the following sections, the workflow of the analysis will be presented.

### 2.5.1 Workflow of Marking of Performance Assessments

For each PA, students' responses were collected into the database. Markers were required to mark the students' scripts according to the scoring rubrics. There were seven dimensions of IL: "define", "access", "manage", "integrate", "create", "communicate" and "evaluate" to be assessed. For each PA, altogether 8 scores were computed. Seven of the indicators were the respective score for each of the 7 IL dimensions and the 8th indicator was the “total” score. Thereafter, student score in each of the IL dimensions and the “total” score would be used for further quantitative analysis. As most of the items were constructed-response questions, it is critical that each student response should be treated with the same consistent scoring rubrics, regardless of the marker. Therefore, the following measures were taken to ensure reliability in all subjects:

- The marker should be knowledgeable in Mathematics, Chinese (i.e. Chinese Language), Science and Technical curriculum areas or someone who had taught at primary schools and secondary schools.
- One and a half day training had been arranged for the markers to familiarize themselves with the application of the scoring rubrics.
- Markers were grouped into teams of two headed by the subject leaders and each team member was requested to mark 60 student scripts (which had already been marked by the subject leader) in the marker training sessions. The subject leaders’ primary responsibility was to monitor scoring reliability by continually checking and rechecking the scores given by the markers. Markers would also discuss among themselves. Such training was to detect any misunderstanding of the scoring rubrics and for clarification and rectification of mistakes.
- Thereafter, each marker was asked to mark another 40 student scripts individually, check the scores with his / her teammate and discuss when discrepancies were found.
- The level of agreement between the scores assigned by the two markers of each team was a measure of the reliability of the scoring process and the results would be reported in the next chapter.

### 2.5.2 Analysis of Performance Assessments and Questionnaires

The following analyses on the PAs were performed:

- The basic descriptives for the 8 IL indicators of Technical PA, Mathematics PA, Primary and Secondary Chinese Language PAs and Science PA were computed to find out the level of IL proficiency that students had achieved. The weighted student data for primary and secondary schools were used for the descriptive analysis. As there was only a small amount of data collected in the special schools, no weighting was applied.
- Samples of students’ work illustrating the different levels of expertise were selected and described.
- ANOVA was conducted on each of the 8 indicators to test whether there were any significant differences across schools.
- ANOVA was also conducted to compare the results of the technical PA at the two different education levels, namely, primary 5 (P5) and secondary 2 (S2).

- Pearson Correlation analysis was used to test whether there were any relationships between the IL competence of students and their technical proficiency.

The following analyses on the four sets of questionnaires were performed:

- Computation of the basic descriptives for School Head Questionnaire, Teacher Questionnaire, ITC Questionnaire and Student Questionnaire was performed.
- Descriptive analysis on school level factors (based on School Head Questionnaire, ITC Questionnaire and Teacher Questionnaire) such as pedagogical practices and the use of ICT, priority of resource allocation and resource support provided by ICT coordinator would also be explored.
- Factors constructed by factor analyses from SITES 2006 were used to further analyse data collected from School Head Questionnaire and Teacher Questionnaire in this study.

The following analyses on the PAs and questionnaires were performed:

- ANOVA was conducted to examine significant differences in students' PA performances with regard to their gender, years of computer use, access to computer at home and duration of daily computer use at home.
- ANOVA was conducted to examine significant differences in PA performances across schools, with regard to their medium of instruction, ability grouping, school location, school sex and operational session.
- The Project Team also intended to explore the possibility in using multilevel analysis to see if there were relationships between the school level factors (based on School Head Questionnaire, ITC Questionnaire and Teacher Questionnaire) and the students' IL competence scores as measured in Technical PA and in different KLA-based PAs. However, due to the small amount of data collected in the three questionnaires, data could not be converted.

Finally, the Project Team would also review the relevant findings and recommendations of Phase (I) study to compile the recommendations for this study.

# Chapter 3 Sampling and Response Rates

## 3.1 Target Population

The first task of any sampling procedure is to define clearly the population of individuals the study is interested in. In this study, the target population included primary 5 (P5) and secondary 2 (S2) students in the 2006/2007 academic year and those class teachers teaching the related subjects (Chinese Language and Mathematics at P5 as well as Chinese Language and Science at S2 ) as well as school heads and IT coordinators (ITCs) in the sampled schools. International schools and English Schools Foundation Schools were excluded from the study. The sampling frame contains the school identity number, school size for the target grades and the overall student ability level (high, mid and low for Secondary; high, mid, low and unclassified for Primary) with reference to the P4 and S1 students of the sampled schools in the 2005/2006 school year.

## 3.2 Sampling Procedures

The sampling scheme of schools includes three stages. The first is the selection of schools, then the classes and finally the students.

### 3.2.1 Sampling of Schools

The target sample size is 60 at each of the two school levels, primary and junior secondary. The study also intended to include 5 special schools.

For the sampling of primary and secondary schools, stratified random sampling was conducted based on broad categorization of mean academic ability of students in those schools in order to provide a sample that reflected the academic ability profile of all students in the territory. It also allowed for the possibility of finding out whether there was any relationship between students' general academic ability and their IL competence. In view of the small sample size, only one implicit stratum, the overall student ability level, was adopted in the sampling process. For each sampled school, two replacement schools were also drawn to ensure that a matching replacement school would be available in the event that the sampled school refused to participate in the study.

#### *3.2.1.1 Sampling of special schools*

For special schools, the sampling stratum was based on the school category. The selection of the special schools was based on two criteria: the students were of normal intelligence and were attending the school as a stable arrangement (i.e. hospital schools were excluded). As a result, the special schools were drawn from the following four categories: Schools for Children with Visual Impairment, Schools for Children with Hearing Impairment, Schools for Children with Physical Disability and Schools for Social Development. The selection of the special schools was different from that of primary and secondary schools. The steps involved are listed as follows:

1. A total of 17 special schools belonging to the above 4 categories were included in the sampling frame.
2. For each stratum (i.e. each category of schools), schools were sampled purposefully by seeking advice from experts in the special school sector on the general level of ICT use for learning and teaching in the schools included in the sampling frame.
3. Two additional schools were also selected from each category as the replacement schools, with the exception of the category Schools for Children with Visual Impairment for which no replacement school was available.

#### *3.2.1.2 Sampling of primary and secondary schools*

The sampling process for primary and secondary schools was conducted as follows:

1. The sampling frames contained school identity number, school size and overall student ability level with reference to P4 and S1 enrolments in the 2005/2006 school year (The target grades for administration of the PAs in the 2006/2007 academic year were P5 and S2 for the primary and secondary levels respectively. However, the sampling had to be completed before summer 2006. Therefore, the sampling frame was based on P4 and S1 enrolment information.). The schools were grouped into sampling strata based on the overall student ability level.
2. The number of schools to be sampled in each stratum was determined using the following formula:

$$60 \times \frac{\text{total number of students in the specific stratum}}{\text{total number of students in the entire target grade}}$$

3. Schools within a stratum were listed in descending order of school size (the number of students is known as the measure of size (mos)) in the target grade. The cumulative measure of size (cmos) is then calculated from the first to the last schools for all schools.
4. A sampling interval for primary and secondary schools was defined by dividing the total number of students in the entire population of the target grade in Hong Kong by the desired number of schools to be sampled. For example, the total number of students in P4 in January 2006 was 67493; therefore the sampling interval for primary schools was 1124.88.
5. A random number between 0 and 1 was then chosen from a random number table. For example, the random number selected for primary schools was 0.2975. This number was then multiplied by the sampling interval to give us the random number that would be used to start the selection procedure. In this case, the start number was 335. Given this starting random number, the $2^{nd}$, $3^{rd}$, $4^{th}$, …numbers were obtained by just adding the sampling interval to the initial random number, thus generating the numbers 335, 335+1124.88=1460; 1460+1124.88=2585, etc.
6. A school was selected into the sample if a number generated fell between the cmos of the preceding school and the cmos of that school. For example, in Table 3.1 below, school 7

was selected because the number 1460 is within the cmos of that school, namely, between 1409 and 1606. The 2 schools following a selected school on the list were then designated as replacement schools in case the selected school was unable to participate in the study. For example, schools 3 and 4 are replacement schools for the sampled school 2.

Table 3.1 shows a partial listing of schools in the sampling frame to illustrate how the sample and replacement schools were selected.

*Table 3.1 Sampling procedure of schools*

| School Identity Number | Implicit Stratum | Measure of Size (mos) | Cumulative Measure of Size (cmos) | Random Number | Sample Status |
|---|---|---|---|---|---|
| 1 | H | 303 | 303 | | |
| 2 | H | 243 | 546 | 335 | Selected |
| 3 | H | 234 | 780 | | Replacement 1 |
| 4 | H | 217 | 997 | | Replacement 2 |
| 5 | H | 212 | 1209 | | |
| 6 | H | 200 | 1409 | | |
| 7 | H | 197 | 1606 | 335+1124.88=1460 | Selected |
| 8 | H | 197 | 1803 | | Replacement 1 |
| 9 | H | 195 | 1998 | | Replacement 2 |
| 10 | H | 194 | 2192 | | |
| 11 | H | 191 | 2383 | | |
| 12 | H | 189 | 2572 | | |

### 3.2.2 Sampling of Classes

One intact class of the target grade level was sampled from each of the sampled schools to participate in the PAs. As it could generally be assumed that class sizes were very similar within the same school in Hong Kong, only random sampling was conducted at the class level for each sampled school to select one class out of all the classes at the target grade level in the school. The teachers teaching the sampled classes in the assessed KLAs (which were the Mathematics and Chinese Language teachers of the sampled class at the primary level, and the Science and Chinese Language teachers of the sampled class at the secondary level) formed the sample of teachers to complete the Teacher Questionnaire.

### 3.2.3 Sampling of Students

Three PAs (the technical proficiency tasks and the information literacy tasks for two KLAs) in addition to the Student Questionnaire were administered at primary and secondary levels to the students. PAs of the kind designed and administered in this study are actually cutting edge research even at an international level and there are not many examples of such in the research literature. Literature related to the design and administration of PAs in IL for special school students cannot be located. It is expected that special arrangements will need to be made for conducting PAs for students in special schools and the inclusion of special schools will allow us to explore the feasibility and necessary adaptations for using this type of PAs with special school students. Therefore, only students in secondary 2 or equivalent were to take part in this study from the special school sector.

In order to reduce the assessment load on the sampled students, each student only had to complete two of the PAs. Hence, students in each of the sampled classes were randomly assigned into one of the 3 groups, each of which took a different combination of two out of the 3 PAs. An example of the detailed arrangement at the primary level is illustrated in Table 3.2.

*Table 3.2 Performance assessments conducted at a sampled P5 class*

| Sequence of Online Tasks for Students | Group 1 | Group 2 | Group 3 |
|---|---|---|---|
| 1 | Student Questionnaire | Student Questionnaire | Student Questionnaire |
| 2 | Technical proficiency tasks | IL tasks for Chinese Language | IL tasks for Mathematics |
| 3 | IL tasks for Chinese Language | IL tasks for Mathematics | Technical proficiency tasks |

In order to reduce the scoring and coding load, it was planned that not all of the completed work from students would be marked. For primary and secondary schools, 4 students would be randomly sampled from each of the 3 groups of students so that there would be assessment results from 12 students in each sampled class resulting in a total student sample of 720 students at each level. For special schools, completed work of 6 students in each sampled class (i.e. 2 students for each PA) would be marked and resulted in a total of 30 students in the sample. Appendix 3.1 summarizes the sample sizes for the different groups of respondents in the three school sectors as proposed in the study.

## 3.3 Sampling Weights

In this study, we calculated the sampling weights using the procedure adopted in the Third International Mathematics and Science Study (TIMSS). Sampling weights were calculated according to a three-step procedure that calculated the school weight, class weight and student weight respectively. Sampling weight was calculated for data collected from the primary and secondary schools, but not for special schools because of the very limited sample size and large variability within the sample.

### 3.3.1 School Weight

#### *3.3.1.1 First school weight*

The basic school weight for the $i^{th}$ sampled school is calculated using the following formula:

$$BW_{sc}^{i} = \frac{M}{n.m_i}$$

Where n is the number of sampled schools (include those "non-response" schools), $m_i$ is the measure of size for the $i^{th}$ school, and

$$M = \sum_{i=1}^{N} M_i$$

N is the total number of schools in the implicit stratum.

#### *3.3.1.2 School non-participation adjustment*

The school participation adjustment is calculated in each stratum using the following formula:

$$A_{sc} = \frac{n_s + n_{r1} + n_{r2} + n_{nr}}{n_s + n_{r1} + n_{r2}}$$

Where $n_s$ is the number of originally sampled schools that participated, $n_{r1}$ and $n_{r2}$ are the respective numbers of the first and the second replacement schools and $n_{nr}$ is the number of "non-response" schools (i.e. sampled schools that did not participate and without any participating replacement schools).

#### *3.3.1.3 Final school weight*

The final school weight for the $i^{th}$ school is:

$$FW_{sc}^{i} = A_{sc} \cdot BW_{sc}^{i}$$

### 3.3.2 Class Weight

In this study, equal probability weighting was used for the classroom weight. For the $i^{th}$ school, $C^i$ is the total number of classes in the target grade and $c^i$ is the number of sampled classes. The class weight is:

$$BW_{cl1}^{i} = \frac{C^i}{c^i}$$

### 3.3.3 Student Weight

In this study, all students in the intact classes were sampled. Therefore, the student weight for the $j^{th}$ class in the $i^{th}$ school is:

$$BW_{st1}^{ij} = 1$$

Adjustment for student non-participation is calculated as follows:

$$A_{st}^{ij} = \frac{S_{rs}^{ij} + S_{nr}^{ij}}{S_{rs}^{ij}}$$

where $S_{rs}^{ij}$ is the number of students in the $j^{th}$ class of the $i^{th}$ school that participated in the study and $S_{nr}^{ij}$ is the number of non-participating students in the $j^{th}$ class of the $i^{th}$ school.

As a result, the weight for students in the $j^{th}$ class of the $i^{th}$ school after adjustment for non-participating students is:

$$FW_{st}^{ij} = A_{st}^{ij} \cdot BW_{st1}^{ij}$$

### 3.3.4 Overall Sampling Weight

The overall sampling weight for student in the $j^{th}$ class of the $i^{th}$ school is the product of the final school weight, the class weight and the final student weight. The formula is:

$$W^{ij} = F\,W_{sc}^{i} \cdot BW_{cl1}^{i} \cdot FW_{st}^{ij}$$

## 3.4 Response Rates

### 3.4.1 Response Rates at the School Level

A total of 149, 140 and 5 letters were sent to the primary, secondary and special schools respectively to invite them to participate in the study. Forty-three primary schools, 34 secondary and 4 special schools responded positively to the invitation. However, during the Main Study period, 1 secondary school and 3 primary schools informed the Project Team that they needed to withdraw from the Main Study for unforeseen reasons. As a result, a total of 40 (including 2 extra sampled schools) primary schools, 33 (including 3 extra sampled schools) secondary schools and 4 special schools participated in this study. The overall response rates were 26.85%, 23.57%, and 80% for the primary, secondary and special school sector respectively.

The 2 'extra sampled' primary schools and 3 'extra sampled' secondary schools were the replacement schools of the sampled schools, i.e. both respective replacement schools and the sampled schools participated in this study. In this case, the Project Team treated these replacement schools as valid sample and included them in the analysis of this study within the same implicit stratum (Appendix 3.2).

### 3.4.2 Response Rates at the Student Level

Table 3.3 below indicates the total number of students participated in this study. There were differences between the number of students sampled and the actual number of students taking part in this study. This was due to the fact that, there were absentees when the PAs were conducted but the sampling procedures were done in July 2006 and there were students dropped out before / during the conduct of the PAs (December 2006 to early April 2007). This difference was reflected in calculating the sampling weight.

*Table 3.3 Number of students sampled and the actual number of students participated in the study*

| School Type | Total No. of Students Sampled in July 2006 | Total No. of Students Participated in the Study | Response Rate |
|---|---|---|---|
| Primary | 1340 | 1320 | 98.51% |
| Secondary | 1300 | 1302 | 100.15% |
| Special | 41 | 35 | 85.37% |

### 3.4.3 Performance Assessment Scripts Collected

According to the original proposal as described in Section 3.2.3, only attempted scripts of the randomly selected students would be marked. Due to the low response rate, the Project Team decided to mark all the students' scripts of the sampled classes in order to compensate the low response rate. Tables 3.4 and 3.5 below show the number of scripts collected for each set of PAs and indicate the number of students who had taken both sets of PAs.

*Table 3.4 No. of students who took part in each of the PAs*

| Level / PA / School Type | Primary 5 | | | Secondary 2 | | |
|---|---|---|---|---|---|---|
| | Mathematics | Technical | Chinese Language | Science | Technical | Chinese Language |
| Primary | 844 | 830 | 825 | / | / | / |
| Secondary | / | / | / | 845 | 823 | 820 |
| Special | / | / | / | 21 | 22 | 24 |
| Total | 844 | 830 | 825 | 866 | 845 | 844 |

*Table 3.5 No. of students who took part in the different combinations of PAs*

| Level / PA / School Type | Primary 5 | | | Secondary 2 | | |
|---|---|---|---|---|---|---|
| | Chinese Language & Mathematics | Mathematics & Technical | Chinese Language & Technical | Chinese Language & Science | Chinese Language & Technical | Science & Technical |
| Primary | 408 | 407 | 399 | / | / | / |
| Secondary | / | / | / | 412 | 395 | 417 |
| Special | / | / | / | 12 | 12 | 9 |
| Total | 408 | 407 | 399 | 424 | 407 | 426 |

### 3.4.4 Number of Questionnaires Collected

The response rates for Student Questionnaire are shown in Table 3.6 below.

*Table 3.6 The response rates for Student Questionnaire*

| School Type | Total No. of Students Sampled in July 2006 | Total No. of Students Participated in the Questionnaire | Response Rate |
|---|---|---|---|
| Primary | 1340 | 1227 | 91.57% |
| Secondary | 1300 | 1234 | 94.92% |
| Special | 41 | 33 | 80.49% |

The response rates for School Head Questionnaire and ITC Questionnaire as well as subject teacher questionnaires in the Main Study are presented respectively in Tables 3.7 and 3.8 below.

*Table 3.7 The response rates for School Head and ITC Questionnaires*

| School Type | No. of Participating Schools | School Head Questionnaires | | ITC Questionnaires | |
|---|---|---|---|---|---|
| | | No. of Returns | Response Rate | No. of Returns | Response Rate |
| Primary | 40 | 37 | 92.50% | 38 | 95% |
| Secondary | 33 | 31 | 93.94% | 33 | 100% |
| Special | 4 | 3 | 75% | 4 | 100% |

*Table 3.8 The response rates for Teacher Questionnaire*

| School Type | Chinese Language Teachers | | | Science Teachers | | | Mathematics Teachers | | |
|---|---|---|---|---|---|---|---|---|---|
| | Sample Size | No. of Returns | Response Rate | Sample Size | No. of Returns | Response Rate | Sample Size | No. of Returns | Response Rate |
| Primary | 42 | 41 | 97.62% | / | / | / | 44 | 40 | 90.91% |
| Secondary | 39 | 35 | 89.74% | 35 | 34 | 97.14% | / | / | / |
| Special | 6 | 3 | 50% | 4 | 3 | 75% | / | / | / |

N.B. - For some schools, there were spilt classes. Therefore, the number of Chinese Language teachers might exceed the total number of schools.
- In one school, there were 3 teachers teaching the same class of Science.
- For some schools, there were spilt classes. Therefore, the number of Mathematics teachers might exceed the total number of schools.

## 3.5 Inter-coder Reliability

The inter-coder reliability was calculated by using Pearson Correlation. The results were: 0.95 in Mathematics, 0.99 in Chinese Language at the primary level, 0.96 in Chinese Language at the secondary level (including both secondary and special schools), 0.95 in Science (including both secondary and special schools) and 0.98 in Technical PA (including primary, secondary and special schools).

## 3.6 Difficulties Encountered and Actions Taken

A number of difficulties had been encountered in this study and measures where appropriate had been taken by the Project Team to address the issues as far as possible. A brief account is given as follows:

### 3.6.1 Response Rate

In this study, the response rates at the school level were very low which caused further problems in the implementation and analysis phases of the study. It was observed that such low response rates were probably related to the fact that there was another evaluation project on the Strategy, i.e. Phase (I) Study conducted concurrently. As reflected by some of the sampled schools, they were confused. Besides, some schools pointed out that they did not have time to participate in both projects. In order to solicit schools' support, extra time and effort was needed to explain to the sampled schools for issues such as the different purposes of Phase (I) Study and Phase (II) Study, the reasons for sending out the invitation letters half a year in advance, and the incentive that each participating school would receive relevant report of findings on their students' online performance assessments.

### 3.6.2 Class Time Allocation for Conducting Performance Assessments

During the invitation periods, many schools indicated that they did not have sufficient time (2 hours and 15 minutes) during scheduled school hours for the students to engage in the PAs. In view of this, the Project Team decided to have the flexibility offered to schools to conduct the PAs in separate school days despite the extra manpower required from the Project Team.

### 3.6.3 Project Timeline

The project timeline for this project was extremely tight and the turn-around time for liaising / discussing with the sampled schools was running short. As mentioned above, some schools mixed up Phase (I) Study and Phase (II) Study, which caused delayed responses from schools. Besides, some schools requested to conduct the assessments in 2 to 3 separate days which increased the workload and resources of the Project Team. Anyhow, the Project Team had tried the very best to accommodate their needs through various means such as continuous negotiations with the persons in-charge in schools via phones calls made by Principal Investigators / Project Manager / Supporting Staff.

### 3.6.4 School Readiness

It was discovered that there were problems encountered on schools' readiness such as infrastructure and technical support in schools. These factors prohibited schools from participating in this study. This aspect would be further elaborated in Chapter 4. In view of this, the Project Team needed to send their computer officer(s) and technical staff to schools to provide support for related system setup for the study.

### 3.6.5 Loading on the Terminal Server

The loading on the terminal server created another problem during the implementation of the PAs. It was observed in the Pilot Study that the system would run slowly when more than 40 students accessed the terminal server at the same time. Therefore, during the Main Study, extra-resources were put in the terminal server and in order to reduce the heavy loading, the Project Team had put in much effort to schedule the data collection time slots so that no two schools would be conducting the PAs at the same time using one server.

# Chapter 4 Field Observations on Performance Assessments

This chapter reports on the general observations of the Main Study Performance Assessments (PAs). The first part of the chapter reports the problems and issues observed during school visits of the project implementation. The second part is related to the findings on the availability of peripherals and settings in computer rooms.

## 4.1 Problems in Relation to IT Infrastructure in Schools

### 4.1.1 Number of Computers

It was mentioned in the Strategy document that improving IT infrastructure in schools was one of the seven strategic goals. However, during the project implementation, it was found that 7.5% of the primary schools (i.e. 3 out of 40) which joined the project did not have enough computers inside the computer rooms for every student of the same class to complete the online assessment at the same time. The student-to-computer ratio in these surveyed classes was about 2:1. The insufficiency of computers has affected the implementation of the project. Only half of the students could take part in the PAs while the other half did not. Teachers in these schools also expressed that students needed to share computers with their classmates during normal lessons.

### 4.1.2 Hardware and Software Updating

During school visits, it was found that about 5% (i.e. 2 out of 40) of the primary schools had problems on upgrading some basic security systems. As the Project Team did not know such problem before the visits, the schedule of the project implementation was affected. For example, one of the primary schools installed the old version of firewall (version 5 instead of version 25) which could not support heavy loading per second. This created a big obstacle for the students in doing the PAs. As a result, there was an unexpected long waiting time during the assessment which affected the performance of students. The Project Team needed to terminate the assessment to solve the problems and arrange for another assessment schedule.

The servers in schools were another problem. 5% (i.e. 2 out of 40) of the primary schools, 3% (i.e. 1 out of 33) of the secondary schools had servers installed with very old Windows NT operating systems which did not support the remote desktop client to access the Project Team's machine. Re-configuration and installation had to be done by our technical staff to solve the problem.

### 4.1.3 School Network and Standard in School Network Setting

20% (i.e. 8 out of 40) of the primary schools and 18.2% (i.e. 6 out of 33) of the secondary schools reported that the network speed was extremely slow and had frequent network disconnection during the assessment. Contingency measures had been taken such as rearranging another date(s) for the assessments or giving extra time for the students to work on the PA tasks to compensate for the time of disconnection. It was investigated that the problem might be caused by:

- Busy school network, especially when the PAs were conducted on school activity days;
- There was no standardized school network setting. For example, it was observed that some schools might use inappropriate network switch (e.g. network switch for home usage) to connect the Internet amongst different computer rooms in schools. Such network switch might be out of function and be disconnected with the school network when there was heavy network traffic within schools.

## 4.2 Problems Related to Technical Support in Schools

It was observed that the technical staff in primary schools in general had adequate knowledge in supporting the daily routine work but they were not skillful enough in handling some new and emerging technology challenges. Before the implementation of the Main Study, schools were asked to set up the connection to the Project Team's server but problems were encountered in schools. About 10% (i.e. 4 out of 40) of the technical supporting staff in primary schools and 3% (i.e. 1 out of 33) of those in secondary schools had problems in setting up the connection even though clear instructions were given. Besides, we were also informed that the Internet service providers (ISPs) had given a set of school network accounts to persons in charge of network systems in schools. However, if network management problems occurred, most of the primary schools would simply call the ISPs to solve the problem.

## 4.3 Problem Related to Third Party System Integrator Maintaining School Network

Apart from the ISPs which provided networking services to schools, it was found that about 17.5% (i.e. 7 out of 40) of the primary schools and 24.24% (i.e. 8 out of 33) of the secondary schools involved a third party System Integrator (SI) for the setup and/or maintenance of their internal school networks such as DNS, firewall, etc. This created problems with the management of school network. It was because the schools did not have the administrative right to manage the school networks. The administrative rights were handed over to the SIs. If network problems occurred, schools needed to seek help from the SIs and could not solve the problems immediately by themselves.

## 4.4 Problems Related to Technical Skills of Students

It was observed that students' technical skills varied a lot in both primary and secondary schools. Result from the invigilator report indicated that 47.5% (i.e. 19 out of 40) of the invigilators of primary schools, 33.3 % (i.e. 11 out of 33) of those in secondary schools and 25% (i.e. 1 out of 4) of those in special schools reported that students had difficulties in using some common computer applications such as inserting a new slide of PowerPoint, image settings, aligning text and drawing tables by using MS Word during the assessment.

## 4.5 Problems Related to Competency in Typing Chinese Characters

During the PAs, both primary and secondary schools students were required to answer some questions in Chinese. Results from the invigilators' reports indicated that about 60% (i.e. 24 out of 40) of the primary schools had students who were incompetent in typing Chinese characters and had to input Chinese with a writing pad. For the secondary schools and special schools, 24.2% (i.e. 8 out of 33) and 25% (i.e. 1 out of 4) of the invigilators reported that students needed to use Chinese writing pad for Chinese input respectively.

In sum, 87.5% (i.e. 35 out of 40) of the primary schools, 63.64 % (i.e. 21 out of 33) of the secondary schools and 25% (i.e. 1 out of 4) of the special schools had encountered at least one of the problems mentioned in sections 4.1 to 4.5 (For details, please refer to Appendices 4.1-4.3).

## 4.6 Availability of Peripherals

During the project implementation, the Project Team observed that the school visits involved could provide good opportunities for the Project Team to look at the actual settings of the computer rooms and respective peripherals available which might be the factors affecting the use of ICT in learning and teaching. Therefore, the Project Team initiated a small scale survey in altogether 22 primary, 16 secondary and 2 special schools some time after the first month of the data collection for the Main Study. The Project Team did not employ any sampling procedures and measures for this small scale survey. Those schools were just the remaining sampled schools during the project implementation. As not all project schools were included in the survey, the results could not be generalized for territory-wide schools. Invigilators of those selected schools were required to fill in the survey form (Appendix 4.4) regarding the setting of the computer room, availability of peripherals, details of operating system and kinds of hardware in the computer room. Table 4.1 shows the results of the survey.

Two types of the computer room setting were identified. They were the traditional one of which computers were arranged in rows or columns and innovative one where computers were arranged in U-shape or other settings with enough space and flexibility in room arrangement to facilitate group work or discussion. The result was that the majority (82% in primary and 87.5% in secondary schools) of the computer room settings were "traditional setting". It was found that half of the surveyed special schools arranged their computers in traditional way and half in innovative way (i.e. emerging setting).

It was observed that about 77.27% of the surveyed primary schools had writing pads for students but only 12.50% of the secondary schools were equipped with such peripheral. There was no writing pad in special schools.

68.18% of the primary schools had earphones in the computer rooms while for the secondary schools and special schools, only 50% of them had installed earphones in computer rooms. It was found out that most of the schools (around 80%) used the same model of computers in the computer rooms while others used a mixture of different models. 50% of the surveyed special schools used LCD monitors while only 31.82% and 37.50% of the primary and secondary schools reported using this peripheral respectively. Over half of the surveyed schools had at least 2 printers installed in computer rooms. 50% of the primary and special schools had scanners in their computer rooms while higher percentage (75%) was found in the secondary schools. Concerning the operation system, most of them were using Windows XP. Regarding the version of MS Office, majority of the primary schools (54.55%) used MS Office 2000 while majority of the secondary schools (50%) used MS Office 2003. For the special schools, 50% of schools used MS Office 2003 and 50% of them used MS Office 2000.

*Table 4.1 Percentage of schools on the availability of different peripherals*

| **Survey items** | | **Primary Schools (%)** | **Secondary Schools (%)** | **Special Schools (%)** |
|---|---|---|---|---|
| Room setting | - traditional setting | 82.00 | 87.50 | 50.00 |
| | - emerging setting | 18.00 | 12.50 | 50.00 |
| Writing pad | | 77.27 | 12.50 | 0.00 |
| Earphone | | 68.18 | 50.00 | 50.00 |
| Same model of computers | | 86.36 | 81.25 | 100.00 |
| LCD monitor | | 31.82 | 37.5 | 50.00 |
| Have 2 printers or above | | 63.64 | 68.75 | 50.00 |
| Scanners | | 50.00 | 75.00 | 50.00 |
| Operation system | Windows 97 | 0.00 | 6.25 | 0.00 |
| | Windows 2000 | 27.27 | 18.75 | 50.00 |
| | Windows 2003 | 9.09 | 0.00 | 0.00 |
| | Windows 2006 | 4.50 | 0.00 | 0.00 |
| | Windows XP | 50.00 | 75.00 | 50.00 |
| | Windows NT | 4.50 | 0.00 | 0.00 |
| | Mix | 4.50 | 0.00 | 0.00 |
| MS Office | MS Office 2003 | 31.82 | 50.00 | 50.00 |
| | MS Office XP | 13.64 | 12.50 | 0.00 |
| | MS Office 2000 | 54.55 | 37.50 | 50.00 |

# Chapter 5 Findings on Technical Performance Assessment

The general findings on Technical Performance Assessment (PA) are reported in this chapter. Altogether, 1675 students took part in the assessment. 830 of them were from the primary schools, 823 of them were from the secondary schools whereas 22 of them were from the special schools. Firstly, general description of the assessment tasks and respective percentages of task completion will be presented. Secondly, the overall descriptive performance in Information Literacy (IL) of Technical PA for all school types including P5 of the primary schools as well as S2 of both the secondary and special schools will be delineated. Thirdly, students' performance at item level and students' authentic works will be described. Fourthly, students' performance across schools and levels will be explored. Finally, difficulty levels of seven dimensions of IL as well as summary and recommendations will be reported. All the descriptive statistics will be weighted for both the primary and secondary schools but not for the special schools due to the small sample size.

## 5.1 Description of the Assessment Tasks

There were totally four main questions in this assessment. Students should complete the assessment in 45 minutes. The scenario of this assessment was to ask students to do a project about planning a trip for their grandfather and grandmother. Students were supposed to form a group of three and suggest two scenic spots in Hong Kong for the trip of their grandparents. They were also asked to reorganize some scenic information in a Word document and create a PowerPoint file for presentation. Finally, students were asked to discuss the scenic spots which they suggested in an online forum. The following table (Table 5.1) provides a brief description of each task and the distribution of the seven IL dimensions in this assessment accordingly.

*Table 5.1 Task description and IL dimensions of Technical PA*

| **Brief Description of the Questions** | | **IL Dimension(s)** | **Highest Competence Level Attained** | **Score** |
|---|---|---|---|---|
| Q1 | Students were asked to search 2 scenic spots from the Internet | | | |
| Q1.1 | To identify appropriate search engine | Access | Proficient | 2 |
| Q1.2 | To define appropriate searching keywords | Define | Advanced | 3 |
| Q1.3 | To identify proper websites | Access | Basic | 1 |
| Q.1.4.1a | To access appropriate scenic spots from websites | Access | Advanced | 3 |
| Q.1.4.1b | To evaluate appropriate reasons to support the suggested scenic spots | Evaluate | Advanced | 3 |
| Q.1.4.2a | To access appropriate scenic spots from websites | Access | Advanced | 3 |
| Q.1.4.2b | To evaluate appropriate reasons to support the suggested scenic spots | Evaluate | Advanced | 3 |

*Table 5.1 Task description and IL dimensions of Technical PA (Continued)*

| Brief Description of the Questions | | IL Dimension(s) | Highest Competence Level Attained | Score |
|---|---|---|---|---|
| Q2 Students were asked to edit a Word document for their groupmates | | | | |
| Q2 | To save a document to an appropriate folder | Manage | Basic | 1 |
| Q2 | To reorganize the information as required | Manage | Advanced | 6 |
| Q2 | To design and enhance the presentation using proper tools | Create | Proficient | 3 |
| Q3 Students were asked to create a PowerPoint for presentation | | | | |
| Q3 | To save a document to an appropriate folder | Manage | Basic | 1 |
| Q3 | To interpret and summarize information found in the Internet | Integrate | Advanced | 6 |
| Q3 | To evaluate and retrieve appropriate information found in the Internet | Evaluate | Advanced | 6 |
| Q3 | To design and enhance the presentation using proper tools | Create | Proficient | 6 |
| Q.4 Students were asked to post ideas and discuss with their classmates in the forum. | | | | |
| Q.4 | To post ideas and discuss with students in the forum | Communicate | Advanced | 3 |

In the following three sections, students' task completion rates will be presented first, followed by students' overall performance in information literacy and the results of students' responses at item level.

## 5.2 Task Completion

Figure 5.1 shows the percentage of task completion for students of different school types (For detailed information, please refer to Appendices 5.1-5.3.). For Question (Q)1, almost all primary, secondary and special school students could complete the tasks successfully. For Q2, nearly 90% of the secondary school students could finish the task successfully, but only around 70% of both primary and special school students could finish the task successfully. For Q3, it was found that fewer students could complete the task successfully. For primary school students, there was a great drop for Q3. Only 46.79% of the primary school students completed Q3 successfully, whereas respective percentages for the secondary school students and the special school students were 69.76% and 68.18%. There was no doubt that more time was needed for the primary school students to complete the assessment than that of the secondary and special school students. For Q4, it was observed again that there was a great drop. Less than 50% of the secondary and special school students and less than 30% of the primary school students could complete Q4 successfully. It might imply that students of the three school types spent too much time on Q3 and did not have enough time to finish Q4 (For more detailed information, please refer to Appendices 5.1-5.3).

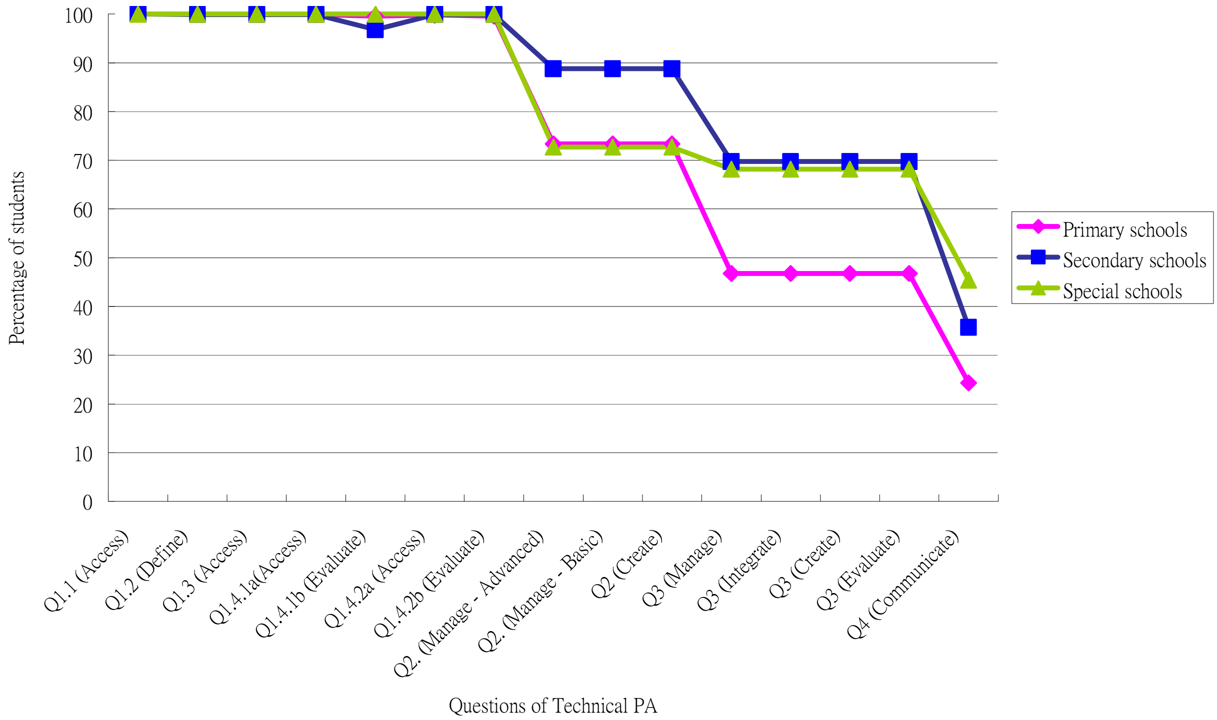



*Figure 5.1 Percentages of primary, secondary and special school students in completing the tasks of Technical PA*

## 5.3 Students' Overall Performance in Information Literacy of Technical Performance Assessment

Tables 5.2a, 5.2b and 5.2c present the mean score of each indicator per school type including primary, secondary and special. The Project Team would like to point out that as the full score of each IL dimension is not the same, only looking at the mean scores may not be sufficient for comparison to be made across dimensions. It is also necessary to look at the mean score percentages for comparison purpose.

There was no surprise that the performance of secondary school students in each IL dimension was better than that of the primary school students. When comparing the results of secondary and special schools students, it was found that the secondary school students performed better in all 7 IL dimensions except "communicate". The "total" score of this PA was 50. For primary school students, the "total" mean score was 14.44 and the maximum "total" was 31.5. For secondary school students, the "total" mean score was 21.88 and the maximum "total" was 39. For special school students, the "total" mean score was 17.34 and the maximum "total" was 33.5.

Among the 7 IL dimensions, students' performance in "access" was remarkably better than other dimensions across the 3 types of schools. On average, all students got over 75% of the full score in the tasks of "access". However, the performances in "create" and "communicate" were relatively poor amongst all students. Less than 5% of the full score was attained by all students in the tasks of "create".

For some dimensions, such as "integrate", "define" and "communicate", the performances were highly different amongst different school types. The difference of the mean scores amongst the 3 school types could be as high as 2 to 4 times. For instances, the mean score of secondary school students on "integrate" was 1.57, compared with 1.09 for the special school students and 0.62 for the primary school students. Furthermore, "standard deviation" of the different dimensions was relatively high. In fact, apart from "create" and "communicate", "standard deviation" of all dimensions was greater than 1 for all three school types. It implied that students' technical competence was highly different amongst and within the different types of schools. According to the mean score percentages, the order for students' achievements across the 7 IL dimensions was the same for each school type. They were (in descending order): "access", "define", "manage", "evaluate", "integrate", "communicate" and "create".

*Table 5.2a Mean scores of primary school students in 8 IL indicators of Technical PA*

| **IL Indicator** | **Minimum (Min)** | **Maximum (Max)** | **Mean Score (a)** | **(SD)** | **Full Score (b)** | **Mean Score Percentage (%) (a)/(b) x 100%** |
|---|---|---|---|---|---|---|
| Define | 0.00 | 3.00 | 1.08 | (1.22) | 3 | 36.00 |
| Access | 0.00 | 9.00 | 6.89 | (2.27) | 9 | 76.56 |
| Manage | 0.00 | 7.00 | 2.50 | (1.95) | 8 | 31.25 |
| Integrate | 0.00 | 5.00 | 0.62 | (1.06) | 6 | 10.33 |
| Create | 0.00 | 3.00 | 0.22 | (0.49) | 9 | 2.44 |
| Communicate | 0.00 | 2.00 | 0.09 | (0.35) | 3 | 3.00 |
| Evaluate | 0.00 | 9.50 | 3.03 | (1.94) | 12 | 25.25 |
| Total | 0.00 | 31.50 | 14.44 | (6.34) | 50 | 28.88 |

N=830
N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are weighted statistics.

*Table 5.2b Mean scores of secondary school students in 8 IL indicators of Technical PA*

| **IL Indicator** | **Min** | **Max** | **Mean Score** | **(SD)** | **Full Score** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|
| Define | 0.00 | 3.00 | 1.91 | (1.21) | 3 | 63.67 |
| Access | 0.00 | 9.00 | 7.78 | (1.71) | 9 | 86.44 |
| Manage | 0.00 | 8.00 | 4.41 | (2.05) | 8 | 55.13 |
| Integrate | 0.00 | 6.00 | 1.57 | (1.51) | 6 | 26.17 |
| Create | 0.00 | 4.00 | 0.42 | (0.70) | 9 | 4.67 |
| Communicate | 0.00 | 3.00 | 0.27 | (0.55) | 3 | 9.00 |
| Evaluate | 0.00 | 12.00 | 5.52 | (2.56) | 12 | 46.00 |
| Total | 0.00 | 39.00 | 21.88 | (6.92) | 50 | 43.76 |

N=823
N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are weighted statistics.

*Table 5.2c Mean scores of special school students in 8 IL indicators of Technical PA*

| **IL Indicator** | **Min** | **Max** | **Mean Score** | **(SD)** | **Full Score** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|
| Define | 0.00 | 3.00 | 1.82 | (1.26) | 3 | 60.67 |
| Access | 3.00 | 9.00 | 6.82 | (1.56) | 9 | 75.78 |
| Manage | 0.00 | 7.50 | 2.98 | (2.52) | 8 | 37.25 |
| Integrate | 0.00 | 5.00 | 1.09 | (1.48) | 6 | 18.17 |
| Create | 0.00 | 3.00 | 0.36 | (0.73) | 9 | 4.00 |
| Communicate | 0.00 | 2.00 | 0.36 | (0.58) | 3 | 12.00 |
| Evaluate | 0.00 | 10.00 | 3.91 | (3.01) | 12 | 32.58 |
| Total | 8.00 | 33.50 | 17.34 | (6.75) | 50 | 34.68 |

N=22
N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are unweighted statistics.

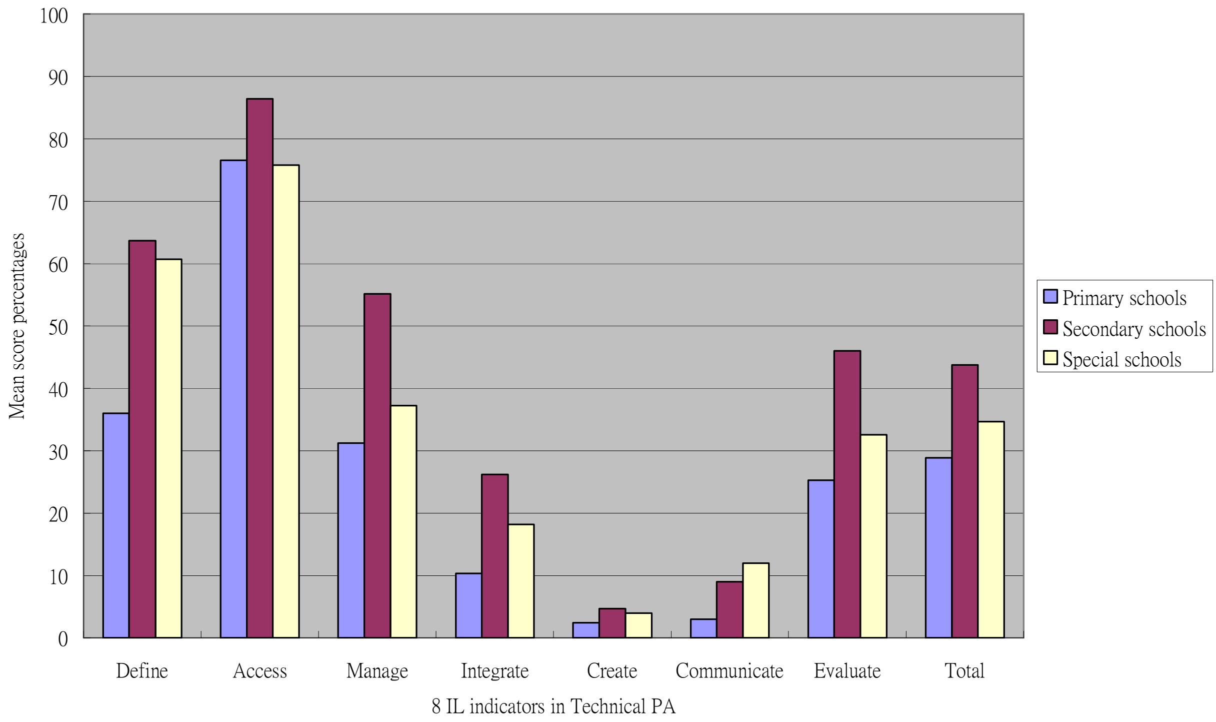



*Figure 5.2 Mean score percentages of primary, secondary and special school students in 8 IL indicators of Technical PA*

## 5.4 Students' Performance at Item Level

### 5.4.1 An Overview

In the following section, the score for each item will be presented and students' levels of achievements will be reported. Besides, observations during the PA and students' authentic work delineating levels of achievement will also be presented. Tables 5.3, 5.4 and 5.5 below show the mean score of each item in the primary, secondary and special schools respectively.

*Table 5.3 Primary school students' mean score of each Technical PA item*

| Question No. | IL Dimension | Min | Max | Mean Score | (SD) | Full Score | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| Q1.1 | Access | 0.00 | 2.00 | 1.67 | (0.72) | 2 | 83.50 |
| Q1.2 | Define | 0.00 | 3.00 | 1.08 | (1.22) | 3 | 36.00 |
| Q1.3 | Access | 0.00 | 1.00 | 0.28 | (0.45) | 1 | 28.00 |
| Q1.4.1a | Access | 0.00 | 3.00 | 2.50 | (1.05) | 3 | 83.33 |
| Q1.4.1b | Evaluate | 0.00 | 3.00 | 1.26 | (0.91) | 3 | 42.00 |
| Q1.4.2a | Access | 0.00 | 3.00 | 2.44 | (1.09) | 3 | 81.33 |
| Q1.4.2b | Evaluate | 0.00 | 3.00 | 1.21 | (0.89) | 3 | 40.33 |
| Q2 | Manage - advanced | 0.00 | 5.50 | 1.40 | (1.42) | 6 | 23.33 |
| Q2 | Manage - basic | 0.00 | 1.00 | 0.70 | (0.46) | 1 | 70.00 |
| Q2 | Create | 0.00 | 2.00 | 0.07 | (0.26) | 3 | 2.33 |
| Q2 | Manage | 0.00 | 1.00 | 0.40 | (0.49) | 1 | 40.00 |
| Q3 | Integrate | 0.00 | 5.00 | 0.62 | (1.06) | 6 | 10.33 |
| Q3 | Create | 0.00 | 3.00 | 0.15 | (0.41) | 6 | 2.50 |
| Q3 | Evaluate | 0.00 | 5.00 | 0.57 | (1.03) | 6 | 9.50 |
| Q4 | Communicate | 0.00 | 2.00 | 0.09 | (0.35) | 3 | 3.00 |

N=830

N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are weighted statistics.

*Table 5.4 Secondary school students' mean score of each Technical PA item*

| Question No. | IL Dimension | Min | Max | Mean Score | (SD) | Full Score | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| Q1.1 | Access | 0.00 | 2.00 | 1.89 | (0.45) | 2 | 94.50 |
| Q1.2 | Define | 0.00 | 3.00 | 1.91 | (1.21) | 3 | 63.67 |
| Q1.3 | Access | 0.00 | 1.00 | 0.57 | (0.50) | 1 | 57.00 |
| Q1.4.1a | Access | 0.00 | 3.00 | 2.67 | (0.78) | 3 | 89.00 |
| Q1.4.1b | Evaluate | 0.00 | 3.00 | 2.04 | (1.07) | 3 | 68.00 |
| Q1.4.2a | Access | 0.00 | 3.00 | 2.66 | (0.83) | 3 | 88.67 |
| Q1.4.2b | Evaluate | 0.00 | 3.00 | 2.05 | (1.05) | 3 | 68.33 |
| Q2 | Manage - advanced | 0.00 | 6.00 | 2.85 | (1.62) | 6 | 47.50 |
| Q2 | Manage - basic | 0.00 | 1.00 | 0.87 | (0.33) | 1 | 87.00 |
| Q2 | Create | 0.00 | 2.00 | 0.14 | (0.35) | 3 | 4.67 |
| Q2 | Manage | 0.00 | 1.00 | 0.68 | (0.46) | 1 | 68.00 |
| Q3 | Integrate | 0.00 | 6.00 | 1.57 | (1.51) | 6 | 26.17 |
| Q3 | Create | 0.00 | 3.00 | 0.28 | (0.55) | 6 | 4.67 |
| Q3 | Evaluate | 0.00 | 6.00 | 1.43 | (1.45) | 6 | 23.83 |
| Q4 | Communicate | 0.00 | 3.00 | 0.27 | (0.55) | 3 | 9.00 |

N=823

N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are weighted statistics.

*Table 5.5 Special school students' mean score of each Technical PA item*

| Question No. | IL Dimension | Min | Max | Mean Score | (SD) | Full Score | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| Q1.1 | Access | 0.00 | 2.00 | 1.32 | (0.95) | 2 | 66.00 |
| Q1.2 | Define | 0.00 | 3.00 | 1.82 | (1.26) | 3 | 60.67 |
| Q1.3 | Access | 0.00 | 1.00 | 0.55 | (0.51) | 1 | 55.00 |
| Q1.4.1a | Access | 0.00 | 3.00 | 2.59 | (0.85) | 3 | 86.33 |
| Q1.4.1b | Evaluate | 0.00 | 3.00 | 1.55 | (1.14) | 3 | 51.67 |
| Q1.4.2a | Access | 0.00 | 3.00 | 2.36 | (1.18) | 3 | 78.67 |
| Q1.4.2b | Evaluate | 0.00 | 3.00 | 1.36 | (1.14) | 3 | 45.33 |
| Q2 | Manage - advanced | 0.00 | 6.00 | 1.61 | (2.16) | 6 | 26.83 |
| Q2 | Manage - basic | 0.00 | 1.00 | 0.68 | (0.48) | 1 | 68.00 |
| Q2 | Create | 0.00 | 1.00 | 0.09 | (0.29) | 3 | 3.00 |
| Q2 | Manage | 0.00 | 1.00 | 0.68 | (0.48) | 1 | 68.00 |
| Q3 | Integrate | 0.00 | 5.00 | 1.09 | (1.48) | 6 | 18.17 |
| Q3 | Create | 0.00 | 2.00 | 0.27 | (0.55) | 6 | 4.50 |
| Q3 | Evaluate | 0.00 | 4.00 | 1.00 | (1.31) | 6 | 16.67 |
| Q4 | Communicate | 0.00 | 2.00 | 0.36 | (0.58) | 3 | 12.00 |

N=22
N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are unweighted statistics.

### 5.4.2 Students' Responses for Each Item

#### *5.4.2.1 Question 1.1*

*Table 5.6 Percentage distribution of students of different school types for each score of Q1.1 of Technical PA*

| School Type | N | Score (%) | | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|---|
| | | .00 | 1.00 | 2.00 | | | |
| Primary | 830 | 15.10 | 2.94 | 81.96 | 100.00 | 1.67 | (0.72) |
| Secondary | 823 | 4.87 | 1.63 | 93.49 | 100.00 | 1.89 | (0.45) |
| Special | 22 | 31.82 | 4.55 | 63.64 | 100.00 | 1.32 | (0.95) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of both primary and secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

In Q1.1, students were asked to identify appropriate search engines for searching information on the Internet. The overall performance for this task was very good. It was observed that most students would like to use "Yahoo! Hong Kong" as their search engine. "Google" was also commonly answered. Besides, a few students answered "MSN" and "SINA" in this question. It was also found that some students misunderstood the meaning of the question and provided the wrong answers such as "I have ever used the three searching engines mentioned above (我已經使用過以

上所提給的三個搜尋引擎)”.

For primary school students, the mean score was 1.67 and the standard deviation was 0.72. The performance was very good, but slightly poorer than that of the secondary school students. 81.96% of the students got full marks. Only 2.94% of the students got 1 mark and 15.10% of the students got 0 mark in this task. The common answers were “Yahoo” and “Google”. The standard deviation was low (0.72), but slightly higher than that of the secondary school students.

For secondary school students, the mean score was 1.89 and the standard deviation was 0.45. The performance of the students was excellent. 93.49% of the students got full marks and only 6.5% of them got 1 or 0 mark in this task. The common answers were “Yahoo” and “Google”. Some students even gave a complete sentence (e.g. I have used Yahoo! Hong Kong and Google's engine both for searching on the Internet.) as the answer. The standard deviation was 0.45, which meant that there was little variation amongst the secondary school students.

For special school students, the mean score was 1.32 and the standard deviation was 0.95. The performance was also good, but it was poorer than those of the primary and secondary school students. More than half of the students (63.64%) got full marks in this task. 31.82% of the students got 0 mark and 4.55% of the students got 1 mark. The common answer was “Yahoo”. However, the standard deviation was relatively high (0.95), when compared with those of the primary and secondary school students.

Here are some examples of students’ answers in Q1.1.

| | |
|---|---|
| Proficient level (2 marks) | • 雅虎香港 (Student: 230028)<br>• Google (Student: 228027) |
| Basic level (1 mark) | • 雅虎香港 海洋公園 (Student: 119013)<br>• yahoo google wiki my geography knowledge (Student: 219022) |
| Novice level (0 mark) | • 使用過 (Student: 135013)<br>• 沒有 (Student: 225017) |

#### *5.4.2.2 Question 1.2*

*Table 5.7 Percentage distribution of students of different school types for each score of Q1.2 of Technical PA*

| **School Type** | **N** | **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|---|---|
| | | .00 | 1.00 | 2.00 | 3.00 | | | |
| Primary | 830 | 45.77 | 25.74 | 3.17 | 25.33 | 100.00 | 1.08 | (1.22) |
| Secondary | 823 | 17.52 | 25.69 | 4.57 | 52.22 | 100.00 | 1.91 | (1.21) |
| Special | 22 | 18.18 | 31.82 | 0.00 | 50.00 | 100.00 | 1.82 | (1.26) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of both primary and secondary schools are weighted statistics. - - Figures may not sum to 100 percent because of rounding.

In Q1.2, students were asked to define appropriate keywords for searching "Discover Hong Kong" website. Similar to Q1.1, some of them answered this question in complete sentence (e.g. 我曾經用過精采香港、香港旅遊發展局的關鍵詞。). However, some students could not get full marks as their answers contained appropriate as well as inappropriate keywords. Besides, quite a number of students got only 1 mark in this question. Most of them misunderstood the question and provided keywords for searching scenic spots directly, rather than searching the "Discover Hong Kong" website.

For primary school students, the mean score was 1.08, which was remarkably lower than that of secondary school students. However, the standard deviation was 1.22, which was similar to that of the secondary school students. Only 25.33% of the students got full marks, which was much lower than those of the secondary and special school students. About 3.17% of the students got 2 marks and 25.74% of the students got 1 mark, which was similar to that of the secondary school students. However, almost half (45.77%) of the students got 0 mark in this question.

Here are some other examples of primary school students' answers in Q1.2 in novice level.

| | |
|---|---|
| Novice level (0 mark) | • 平靜 (Student: 127032)<br>• 中國之最 (Student: 140034)<br>• 中國最長的河 (Student: 140019)<br>• 歷史的人物 (Student: 133030) |

For secondary school students, the mean score was 1.91 and the standard deviation was 1.21. On average, secondary school students could reach the proficient level in this task. However, the variation amongst students was relatively wide. Over 50% (52.22%) of the students got full marks in this question and attained the advanced level. However, around a quarter of the students (25.69%) got 1 mark. It implied that quite a lot of students did not read the question carefully and provided keywords for searching scenic spot directly. Besides, 4.57% of the students got 2 marks and 17.52% of the students got 0 mark. Based on the results of the primary and secondary school students, there might be an implication that higher form students had higher ability in defining information.

For special school students, the mean score was 1.82, which was remarkably higher than that of the primary school students, although it was slightly lower than that of the secondary school students. The standard deviation was 1.26, which was slightly higher than those of the primary and secondary school students. The performance was good. About half of the students (50%) got full marks in this question. However, quite a lot of students (31.82%) only got 1 mark in this question, which was the highest score attained when compared to the schools of the other two school types. Besides, no one got 2 marks and 18.18% of the students got 0 mark in this question.

Here are some examples of students' answers in Q1.2.

| | |
|---|---|
| Advanced level (3 marks) | • 精采香港，香港旅遊發展局 (Student: 202032)<br>• 精采香港 (Student: 126016) |
| Proficient level (2 marks) | • 香港人，精采香港 (Student: 233040)<br>• 精采香港　長者的好去處 (Student: 214022) |
| Basic level (1 mark) | • 天壇大佛 (Student: 229020)<br>• 香港十大景點 (Student: 137029) |
| Novice level (0 mark) | • 電腦遊戲 (Student: 232032)<br>• 唱Ｋ小魚仙 (Student: 132014) |

#### *5.4.2.3 Question 1.3*

*Table 5.8 Percentage distribution of students of different school types for each score of Q1.3 of Technical PA*

| **School Type** | **N** | **Score (%)** | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|
| | | .00 | 1.00 | | | |
| Primary | 830 | 71.88 | 28.12 | 100.00 | 0.28 | (0.45) |
| Secondary | 823 | 43.24 | 56.76 | 100.00 | 0.57 | (0.50) |
| Special | 22 | 45.45 | 54.55 | 100.00 | 0.55 | (0.51) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of both primary and secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

In Q1.3, students were asked to provide an URL of the "Discover Hong Kong" website which they had found on the Internet. Some students could not get any marks in this question because the URL they provided was the website of some scenic information found on the Internet, rather than the "Discover Hong Kong" website.

For primary school students, the mean score was 0.28, which was remarkably lower than those of the secondary and special school students. However, the standard deviation was 0.45, which was similar to the other two school types. For the percentage of each score in this question, only 28.12%

of the students provided the correct URL and got full marks in this question. The rest (71.88%) of the students got 0 mark.

For secondary school students, their performance in this task was good. The mean score was 0.57, which was the highest amongst three school types. The standard deviation was 0.50. For the percentage of each score in this question, 56.76% of the students got 1 mark, which provided the correct URL of “Discover Hong Kong” and 43.24% of the students got 0 mark.

For special school students, the performance was similar to that of the secondary school students, but slightly poorer. The mean score was 0.55 and the standard deviation was 0.51. Over half of the students (54.55%) got full marks and 45.45% of them got 0 mark.
When comparing across the three school types, there was no doubt that the performance of the secondary and special school students was much better than that of the primary school students in this question. In other words, it showed that there was a big difference in the ability to correctly access information on the Internet amongst students of different school types. Besides, it was observed that if the students answered Q1.2 correctly, most likely, they could also answer Q1.3 correctly.

Here are some examples of students’ answers in Q1.3.

| | |
|---|---|
| Basic level (1 mark) | • http://www.discoverhongkong.com/tc/index.jsp (Student 232034)<br>• http://www.discoverhongkong.com (Student 133032) |
| Novice level (0 mark) | • http://travel.tvb.com/travelinfo/info_3568.html (Student 110022)<br>• http://www.orientaltravel.com/china/Hong_Kong_scenic_spots.htm (Student 228036) |

### *5.4.2.4 Question 1.4.1a, 1.4.2a*

*Table 5.9a Percentage distribution of students of different school types for each score of Q1.4.1a and Q1.4.2a of Technical PA*

| **Question No.** | **School Type** | **N** | **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|---|---|---|
| | | | .00 | 1.00 | 2.00 | 3.00 | | | |
| Q1.4.1a | Primary | 830 | 13.15 | 2.87 | 5.25 | 78.73 | 100.00 | 2.50 | (1.05) |
| | Secondary | 823 | 5.41 | 3.36 | 9.98 | 81.25 | 100.00 | 2.67 | (0.78) |
| | Special | 22 | 4.55 | 9.09 | 9.09 | 77.27 | 100.00 | 2.59 | (0.85) |
| Q1.4.2a | Primary | 830 | 14.72 | 2.54 | 6.72 | 76.02 | 100.00 | 2.44 | (1.09) |
| | Secondary | 823 | 7.20 | 1.99 | 8.63 | 82.18 | 100.00 | 2.66 | (0.83) |
| | Special | 22 | 18.18 | 0.00 | 9.09 | 72.73 | 100.00 | 2.36 | (1.18) |

N.B. - N listed in the table is the unweighted number of students.
- “Score (%)”, “Mean Score” and “SD” of both primary and secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

*Table 5.9b Mean percentage distribution of students of different school types for each score of Q1.4.1a and Q1.4.2a of Technical PA*

| **Question No.** | **School Type** | **N** | **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|---|---|---|
| | | | .00 | 1.00 | 2.00 | 3.00 | | | |
| Q1.4.1a & Q1.4.2a | Primary | 830 | 13.94 | 2.71 | 5.99 | 77.38 | 100.00 | 2.47 | 1.07 |
| | Secondary | 823 | 6.31 | 2.68 | 9.31 | 81.72 | 100.00 | 2.67 | 0.81 |
| | Special | 22 | 11.37 | 4.55 | 9.09 | 75.00 | 100.00 | 2.48 | 1.02 |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of both primary and secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

In Q1.4.1a and Q1.4.2a, students were asked to provide two scenic spots found on the Internet. Students' performances in these questions were very good and quite a number of the students provided relevant scenic spots in these questions. It was also observed that most scenic spots which they suggested were found in the "Discover Hong Kong" website. It showed that they could understand the questions and locate the information correctly on the Internet. Besides, some students provided the activity name (e.g. 農曆新年煙花匯, 幻彩詠香江, 香港繽紛冬日節) instead of the scenic spots.

For primary school students, the overall mean score for Q1.4.1a and Q1.4.2a as shown in Table 5.9b was 2.47. Although it was a little bit poorer than that of the secondary school students, the performance of the primary school students in this question was also good. The overall standard deviation was over 1, which was relatively higher than that of the secondary school students. Besides, 77.38% of the students got full marks in these questions whereas on average 5.99% of the students got 2 marks and 2.71% of them got 1 mark. However, on average 13.94% of the students got 0 mark as they provided irrelevant or incorrect answers in these questions, such as Japan and Macau.

For secondary school students, the overall mean score for Q1.4.1a and Q1.4.2a as shown in Table 5.9b was 2.67 and the standard deviation was 0.81. Over 80% of the students got full marks and provided correct scenic spots in these questions. However, on average, 9.31% of the students only got 2 marks. It was observed that in most case, students could not get full marks as the scenic spots which they suggested were too simple or general, such as, Tsim Sha Tsui, Aberdeen and so on. On average, 2.68% of the students got 1 mark and 6.31% of them got 0 mark.

For special school students, the overall mean score for Q1.4.1a and Q1.4.2a as shown in Table 5.9b was 2.48 and the overall standard deviation was 1.02, which was similar to the performance of primary school students. For the average percentage of Q1.4.1a and Q1.4.2a as shown in Table 5.9b, 75% of the students got full marks. 9.09% of the students got 2 marks, whereas 4.55% of them got 1 mark and 11.37% of them got 0 mark.

When comparing across the three school types, all students performed very well in these questions. It was found that quite a number of the primary school students (13.94%) provided scenic spots which were irrelevant or incorrect and got 0 mark in these questions. Such situation seemed less frequently noted in the other two school types.

Here are some examples of students' answers in Q1.4.1a and Q1.4.2a.

| | |
|---|---|
| Advanced level (3 marks) | • 太平山頂 (Student: 214035)<br>• 天壇大佛 (Student: 125026) |
| Proficient level (2 marks) | • 九龍城 (Student: 202019)<br>• 黃大仙 (Student: 103026) |
| Basic level (1 mark) | • 街市 (Student: 225014)<br>• 學校 (Student: 102013) |
| Novice level (0 mark) | • 富士山 (Student: 225027)<br>• 曼谷 (Student: 112022) |

#### *5.4.2.5 Question 1.4.1b, 1.4.2b*

*Table 5.10a Percentage distribution of students of different school types for each score of Q1.4.1b and Q1.4.2b of Technical PA*

| Question No. | School Type | N | Score (%) | | | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|---|---|---|
| | | | .00 | 1.00 | 2.00 | 3.00 | | | |
| Q1.4.1b | Primary | 830 | 21.30 | 41.36 | 27.15 | 10.20 | 100.00 | 1.26 | (0.91) |
| | Secondary | 823 | 10.16 | 24.41 | 16.79 | 48.64 | 100.00 | 2.04 | (1.07) |
| | Special | 22 | 22.73 | 27.27 | 22.73 | 27.27 | 100.00 | 1.55 | (1.14) |
| Q1.4.2b | Primary | 830 | 22.53 | 43.56 | 24.75 | 9.16 | 100.00 | 1.21 | (0.89) |
| | Secondary | 823 | 10.26 | 22.16 | 19.77 | 47.80 | 100.00 | 2.05 | (1.05) |
| | Special | 22 | 22.73 | 45.45 | 4.55 | 27.27 | 100.00 | 1.36 | (1.14) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of both primary and secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

*Table 5.10b Mean percentage distribution of students of different school types for each score of Q1.4.1b and Q1.4.2b of Technical PA*

| Question No. | School Type | N | Score (%) | | | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|---|---|---|
| | | | .00 | 1.00 | 2.00 | 3.00 | | | |
| Q1.4.1b & Q1.4.2b | Primary | 830 | 21.92 | 42.46 | 25.95 | 9.68 | 100.00 | 1.24 | (0.90) |
| | Secondary | 823 | 10.21 | 23.29 | 18.28 | 48.22 | 100.00 | 2.05 | (1.06) |
| | Special | 22 | 22.73 | 36.36 | 13.64 | 27.27 | 100.00 | 1.46 | (1.14) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of both primary and secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

In Q1.4.1b and Q1.4.2b, students were asked to give reasons for the scenic spots suggested. Their overall performance in these questions was average. Quite a number of the students got full marks and they provided appropriate reasons to support their suggested scenic spots. Some students could not get full marks as the answers given were relevant but too simple such as “you can have fun there” or “very pretty”. Besides, a number of the students provided unclear or inappropriate answers and got only 1 mark. For examples, “good for play” and “there are many shops”. For the students who got 0 mark in these questions, most of them provided answers which were totally irrelevant or incorrect, such as “no reason”, “I like” and “abc”.

For primary school students, their performances in these questions were much poorer than that of the secondary school students. The overall mean score was 1.24 and the standard deviation was 0.90 for these two questions. The majority of students reached the basic level. On average, 42.46% of the students got 1 mark. The common answer was “good for play”. Besides, 9.68% of the students got full marks in these questions. On average, 25.95% of the students got 2 marks and 21.92% got 0 mark.

For secondary school students, the overall mean score for these two questions was 2.05. It was remarkably higher than those of the primary and special school students. On average, secondary school students could reach the proficient level. However, the standard deviation was 1.06 for these two questions. On average, 48.22% of the students got full marks in these questions. Students performed much better than the other two school types. Besides, on average, 18.28% of the students got 2 marks, 23.29% of them got 1 mark and 10.21% of them got 0 mark.

For special school students, the overall mean score was 1.46 and the standard deviation was 1.14 for these two questions. The performance was relatively poorer than that of the secondary school students, but slightly better than that of the primary school students. The percentage of score was evenly distributed. 27.27% of the students got full marks on average, 13.64% of the students got 2 marks, 36.36% of the students got 1 mark and 22.73% of them got 0 mark.

When comparing across the three school types, secondary school students performed much better than the primary and special school students in these questions. They could provide clearer and more reasonable answers than students of the other two school types. On the other hand, primary and special school students commonly provided answers which were unclear or too simple.

Furthermore, it was commonly found that students’ answers were copied from the websites. They usually copied information from the websites which included irrelevant information and thus, got lower marks. Only a few students tried to use their own words to answer these questions.

Here are some examples of students' answers in Q1.4.1b and Q1.4.2b.

| | |
|---|---|
| Advanced level (3 marks) | • I choose this place is because the old people love Giant Buddha very much. i think they will like to visit there. (Student: 203036)<br>• 因爲那裏景色優美，大街小巷到處都有商店、酒家等，十分適合 老人家去。(Student: 130036) |
| Proficient level (2 marks) | • 風景美麗 (Student: 222024)<br>• 它非常壯觀 (Student: 110035) |
| Basic level (1 mark) | • 夠好玩 (Student: 302014)<br>• 熱鬧 (Student: 105029) |
| Novice level (0 mark) | • 唔知呢 (Student: 232032)<br>• 因爲人多 (Student: 141014) |

#### *5.4.2.6 Question 2*

In Q2, students were asked to edit the format of information in a Word document according to the 6 requirements mentioned in Q2. The requirements of Q2 were:

1. Add Susan's name in the header (0.5 mark) and align it to the right (0.5 mark).
2. Bold (0.5 mark) and underline (0.5 mark) the title.
3. Justify the paragraph (0.5 mark) and change the color of the text into blue (0.5 mark).
4. Insert a related image (1 mark).
5. Add bullet points to the list of items (1 mark).
6. Add (0.5 mark) and center page no. in the footer (0.5 mark).

Students were also asked to make some changes to enhance the presentation with their own ideas. The score of this question was counted by two IL dimensions. They were "manage" and "create". For "manage", there were two tasks to be counted. The first task was to ask students to edit the format of information according to requirements of the question (6 marks). The second task was to ask students to save the document in a proper folder (1 mark). For "create", students were asked to use their own ideas to edit the format of the information (3 marks).

**Q2 Manage (6 marks)**

For the first task of "manage", students were asked to edit the format of information according to the requirements of the question. In general, the performance of students was average only. On average, students could only attain some what between basic and proficient levels. Most students were not familiar with the functions of "header", "footer", "paragraph alignment" and "bullet items" in Microsoft Word (MS Word); therefore, they could not reach a higher level for this task. Table 5.11 showed the percentage distribution of students of different school types for each score.

For primary school students, 39.93% of them got no mark. 27.58% of the students got 0.5 to 2 marks. 30.26% of the students got 2.5 to 4 marks (proficient level) and only 2.23% of the students got 4.5 to 6 marks (advanced level) in this task. In other words, only 32.49% of the students could reach the proficient level or above. Over 60% (67.51%) of the students could only reach the basic level or below. The standard deviation was high (1.42).

For secondary school students, the majority of the score distribution was at proficient level. The mean score was 2.85 and over 50% of the students got 2.5 to 4 marks. 25.83% out of these 51.34% of the students got 3.5 marks. Basically, there were four functions of MS Word where students commonly lost marks. They were “header”, “footer”, “paragraph alignment” and “bullet items”. Besides, 18% of the students reached the advanced level and got 4.5 to 6 marks. 69.34% of the students reached at least the proficient level (2.50 marks or above). It showed that the performance of the secondary school students in this question was good. However, the standard deviation was high (1.62). Besides, 15.57% of the students got 0.5 to 2 marks whereas 15.07% of them got no mark.

For special school students, their performance in this task had two extremes. 59.09% of the students got no mark in this task. 4.55% of them got 0.5 to 2 marks. 22.69% of the students got 2.5 to 4 marks whereas 13.64% of them got 4.5 to 6 marks. 36.33% of the students could reach at least the proficient level. The mean score was 1.61 which was higher than that of the primary school students. Besides, the standard deviation was 2.16 which was relatively high when compared with those of the primary and secondary school students.

*Table 5.11 Percentage distribution of students of different school types for each score of Q2 (Manage-advanced) of Technical PA*

| **Score** | **Primary (%)** | | **Secondary (%)** | | **Special (%)** | | **IL Competence Level** |
|---|---|---|---|---|---|---|---|
| 0.00 | 39.93 | 39.93 | 15.07 | 15.07 | 59.09 | 59.09 | Novice |
| 0.50 | 4.02 | 27.58 | 1.24 | 15.57 | 0.00 | 4.55 | Basic |
| 1.00 | 7.92 | | 2.21 | | 0.00 | | |
| 1.50 | 8.57 | | 4.47 | | 0.00 | | |
| 2.00 | 7.07 | | 7.65 | | 4.55 | | |
| 2.50 | 10.52 | 30.26 | 9.51 | 51.34 | 0.00 | 22.69 | Proficient |
| 3.00 | 6.83 | | 8.39 | | 9.09 | | |
| 3.50 | 10.54 | | 25.83 | | 13.6 | | |
| 4.00 | 2.37 | | 7.61 | | 0.00 | | |
| 4.50 | 1.65 | 2.23 | 6.98 | 18.00 | 0.00 | 13.64 | Advanced |
| 5.00 | 0.48 | | 4.42 | | 0.00 | | |
| 5.50 | 0.10 | | 4.75 | | 9.09 | | |
| 6.00 | 0.00 | | 1.85 | | 4.55 | | |
| Total | 100.00 | | 100.00 | | 100.00 | | |
| **Mean** | **1.40** | | **2.85** | | **1.61** | | |
| **(SD)** | **(1.42)** | | **(1.62)** | | **(2.16)** | | |
| **N** | **830** | | **823** | | **22** | | |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of both primary and secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

Here are some examples of students' answers in Q2 (Manage) (6 marks).

*Advanced level*

Susan

▪ **<u>Ocean Park</u>**

Ocean Park is a theme park in the Southern District of Hong Kong Island. The marine-themed amusement park covers the area of Wong Chuk Hang and Nam Long Shan, and is Hong Kong's very own theme park. The park was built with donations from the Royal Hong Kong Jockey Club (now The Hong Kong Jockey Club) and opened on 10th January, 1977. The park is operated by Ocean Park Corporation which is a statutory board. It offers affordable marine animal education and entertainment and is a private organization for commercial purposes.

- Facilities
- Headland Rides
- Marine Land
- Bird Paradise
- Kids' World
- Lowland Gardens

(Student: 204038)

蘇珊

<u>太平山頂</u>

太平山頂是香港最受歡迎的名勝景點之一，置身其中鳥瞰山下風光，可見層層疊疊的摩天高樓、享譽全球的維多利亞海港、清新宜人的翠綠山巒，甚至可遠眺繁盛的九龍，景致之美，令人喜出望外！

要登上太平山頂，乘搭山頂纜車絕對是一趟難忘的體驗！整條鐵路以鋼索拖行，列車依山坡斜斜攀升373米（約1,200呎），乘客沿途可俯瞰維多利亞港景致。坐在車廂內，身子不由得向後傾，部分路段斜度達一比二！高樓巨廈、茂密叢木看來好像都倒往一旁了，感覺實在奇妙！

<u>凌霄閣</u>由英國建築師特果‧法雷爾（Terry Farrell）設計，外形呈十分獨特的碗形，是一座兼備觀光、娛樂、購物於一身的綜合大樓。
凌霄閣樓頂，設有一座全新的觀景台，遊人可居高臨下以360度欣賞更廣闊的香港和維港景致，凝聚無限活力的大都會、如詩如畫的自然風光，同時呈現眼前。

- 凌霄閣
- 山頂廣場
- 山頂餐廳

(Student: 138035)

*Proficient level*

Susan

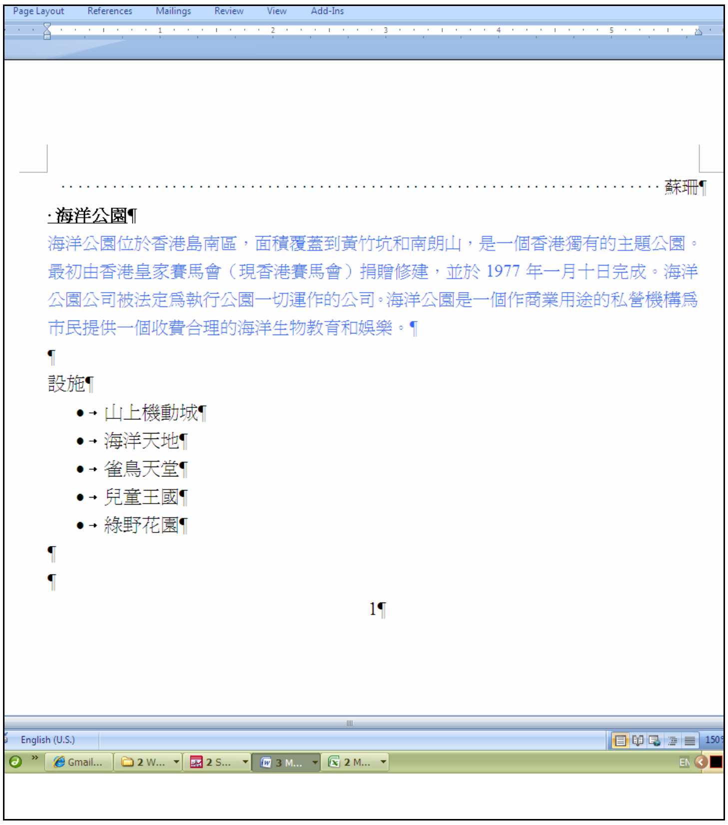
**Ocean Park**

Ocean Park is a theme park in the Southern District of Hong Kong Island. The marine-themed amusement park covers the area of Wong Chuk Hang and Nam Long Shan, and is Hong Kong's very own theme park. The park was built with donations from the Royal Hong Kong Jockey Club (now The Hong Kong Jockey Club) and opened on 10th January, 1977. The park is operated by Ocean Park Corporation which is a statutory board. It offers affordable marine animal education and entertainment and is a private organization for commercial purposes.

21. 6. 2001

Facilities
Headland Rides
Marine Land
Bird Paradise
Kids' World
Lowland Gardens

(Student: 234015)



蘇珊

**海洋公園**

海洋公園位於香港島南區，面積覆蓋到黃竹坑和南朗山，是一個香港獨有的主題公園。最初由香港皇家賽馬會（現香港賽馬會）捐贈修建，並於 1977 年一月十日完成。海洋公園公司被法定爲執行公園一切運作的公司。海洋公園是一個作商業用途的私營機構爲市民提供一個收費合理的海洋生物教育和娛樂。

設施

- 山上機動城
- 海洋天地
- 雀鳥天堂
- 兒童王國
- 綠野花園

1

(Student: 120021)

*Basic level*

海洋公園

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設施

山上機動城
海洋天地
雀鳥天堂
兒童王國
綠野花園

(Student: 232017)

# 海洋公園 蘇珊

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設施
山上機動城
海洋天地
雀鳥天堂
兒童王國
綠野花園

(Student: 138019)

*Novice level*

海洋公園¶
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¶
設施¶
山上機動城¶
海洋天地¶
雀鳥天堂¶
兒童王國¶
綠野花園¶
¶

(Student: 232034)

### Q2 Manage (1 mark)

The second task of "manage" in Q2 was to ask students to save the document in a proper folder. It was found that most students could handle this task well.

*Table 5.12 Percentage distribution of students of different school types for each score of Q2 (Manage-basic) of Technical PA*

| School Type | N | Score (%) | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|
| | | 0.00 | 1.00 | | | |
| Primary | 830 | 30.18 | 69.82 | 100.00 | 0.70 | (0.46) |
| Secondary | 823 | 12.73 | 87.27 | 100.00 | 0.87 | (0.33) |
| Special | 22 | 31.82 | 68.18 | 100.00 | 0.68 | (0.48) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of both primary and secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

Students' performances in this task across different school types were quite similar. It was no surprise that the performance of the secondary school students in this task was slightly better than those of the primary and special school students. The mean score of the secondary school students was 0.87 and 87.27% of them got full marks in this task. On the other hand, the performance of the primary and special school students was not bad. The mean scores of the primary and special school students were 0.70 and 0.68 respectively. Besides, 69.82% of the primary school students and 68.18% of the special school students got full marks in this task.

**Q2 Create (3 marks)**

For "create" in this question, students were asked to use their own ideas to edit the format of information in order to enhance the presentation of information. For this task, the overall performance was bad. Nearly 90% of the primary, secondary and special school students got 0 mark in this task. No student could get 3 marks (i.e. reached the proficient level). It was observed that only a few students were able to use tools which were already built in MS Word to enhance the presentation. Most students only finished the required changes (task of "manage" in Q2) and did nothing for this task.

*Table 5.13 Percentage distribution of students of different school types for each score of Q2 (Create) of Technical PA*

| School Type | N | Score (%) | | | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|---|---|
| | | 0.00 | 1.00 | 2.00 | 3.00 | | | |
| Primary | 830 | 93.59 | 6.2 | 0.21 | 0.00 | 100.00 | 0.07 | (0.26) |
| Secondary | 823 | 86.66 | 13.16 | 0.17 | 0.00 | 100.00 | 0.14 | (0.35) |
| Special | 22 | 90.91 | 9.09 | 0.00 | 0.00 | 100.00 | 0.09 | (0.29) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of both primary and secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

For primary school students, the performance was very bad. The mean score was 0.07 and the standard deviation was 0.26. 93.59% of the students got 0 mark in this task. Only 6.41% of the students reached the basic level and got 1 to 2 marks. No one got full marks in this task.

For secondary school students, this task was poorly done. The mean score was 0.14 and the standard deviation was 0.35. Over 80% of the students got 0 mark. 13.33% of the students reached the basic level and got 1 to 2 marks in this task. Besides, no student got full marks in this task.

For special school students, the performance was similar to those of the primary and secondary school students. The mean score was 0.09 and the standard deviation was 0.29. Over 90% of the students got 0 mark in this task. Besides, 9.09% of the students got 1 mark and no one got 2 or 3 marks in this task.

Here are some examples of students' answers at the proficient and basic levels.

*Proficient level*

珊

海洋公園

簡介

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設施

- 山上機動城
- 海洋天地
- 雀鳥天堂
- 兒童王國
- 綠野花園

(Student: 218017)

*Basic level*

蘇珊

**海洋公園**


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設施

- 山上機動城
- 海洋天地
- 雀鳥天堂
- 兒童王國
- 綠野花園

(Student: 138022)

#### 5.4.2.7 Technical Question 3

For Q3, students were asked to create some PowerPoint slides for presentation. The structures of the slides for each scenic spots were as follows:

- Name of scenic spots
- Time arrangement
- Traffic route(s) to the scenic spots
- One photo per scenic spot
- Two characteristics per scenic spot

The score of this question was counted by four IL dimensions. They were “integrate”, “evaluate”, “manage” and “create”. For “integrate”, students were asked to interpret and summarize information found on the Internet. For “evaluate”, students were asked to evaluate and retrieve appropriate information found on the Internet. For “create”, students were asked to use their own idea to design the layout of the slides in order to enhance the presentation. For “manage”, students were asked to save the PowerPoint file into a proper folder.

**Q3 Integrate (6 Marks)**

For “integrate”, students were asked to interpret and summarize information found on the Internet. Their overall performance in this task was bad. It was observed that most students did not follow the instructions of the question and provided inappropriate contents in their PowerPoint slides. For instance, some students misunderstood the requirements which included the provision of the traffic routes of the scenic spots suggested by the students and provided the opening hours of the scenic spots instead. Another common error was that students were used to “copy and paste” a large amount of information from the web as their answers. Such answers normally contained the correct as well as incorrect information. Therefore, marks were deducted in such case.

*Table 5.14 Percentage distribution of students of different school types for each score of Q3 (Integrate) of Technical PA*

<table>
<tr><th>Score</th><th colspan="2">Primary (%)</th><th colspan="2">Secondary (%)</th><th colspan="2">Special (%)</th><th>IL Competence Level</th></tr>
<tr><td>0.00</td><td>63.93</td><td>63.93</td><td>33.51</td><td>33.51</td><td>45.45</td><td>45.45</td><td>Novice</td></tr>
<tr><td>0.50</td><td>7.68</td><td rowspan="4">25.94</td><td>4.47</td><td rowspan="4">35.29</td><td>13.64</td><td rowspan="4">36.37</td><td rowspan="4">Basic</td></tr>
<tr><td>1.00</td><td>8.12</td><td>9.69</td><td>9.09</td></tr>
<tr><td>1.50</td><td>5.02</td><td>11.55</td><td>4.55</td></tr>
<tr><td>2.00</td><td>5.12</td><td>9.58</td><td>9.09</td></tr>
<tr><td>2.50</td><td>3.36</td><td rowspan="4">9.13</td><td>7.18</td><td rowspan="4">25.24</td><td>0.00</td><td rowspan="4">13.64</td><td rowspan="4">Proficient</td></tr>
<tr><td>3.00</td><td>2.93</td><td>8.25</td><td>9.09</td></tr>
<tr><td>3.50</td><td>1.55</td><td>5.51</td><td>0.00</td></tr>
<tr><td>4.00</td><td>1.29</td><td>4.30</td><td>4.55</td></tr>
<tr><td>4.50</td><td>0.46</td><td rowspan="4">1.01</td><td>2.25</td><td rowspan="4">5.94</td><td>0.00</td><td rowspan="4">4.55</td><td rowspan="4">Advanced</td></tr>
<tr><td>5.00</td><td>0.55</td><td>3.09</td><td>4.55</td></tr>
<tr><td>5.50</td><td>0.00</td><td>0.44</td><td>0.00</td></tr>
<tr><td>6.00</td><td>0.00</td><td>0.16</td><td>0.00</td></tr>
<tr><td>Total</td><td colspan="2">100.00</td><td colspan="2">100.00</td><td colspan="2">100.00</td><td></td></tr>
<tr><td>Mean</td><td colspan="2">0.62</td><td colspan="2">1.57</td><td colspan="2">1.09</td><td></td></tr>
<tr><td>(SD)</td><td colspan="2">(1.06)</td><td colspan="2">(1.51)</td><td colspan="2">(1.48)</td><td></td></tr>
<tr><td>N</td><td colspan="2">830</td><td colspan="2">823</td><td colspan="2">22</td><td></td></tr>
</table>

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of both primary and secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

For primary school students, this task was poorly done. The mean score was 0.62 and the standard deviation was 1.06. There were 53.21% of the students who did not reach the question or showed no response. Including those "not-reached" and "non-response" students, 63.93% of the students got 0 mark in this task. It was observed that quite a number of the students spent too much time in Q2 and therefore could not reach Q3. Besides, 25.94% of the students got 0.5 to 2 marks and attained the basic level. 10.14% of the students got 2.5 to 5 marks and reached at least the proficient level in this task.

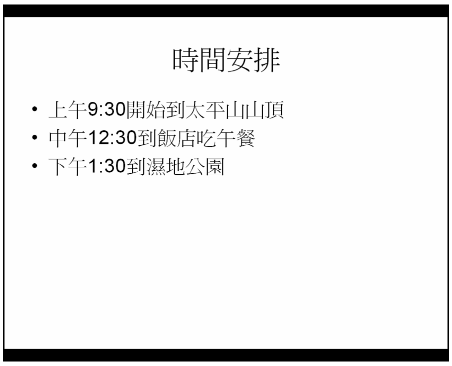
For secondary school students, their performance in this task was not good. The mean score was 1.57, which implied that students could reach the basic level on average. There were 30.24% of the students who either did not reach the question or made no response to this question. Including those "not-reached" and "non-response" students, 33.51% of the students got no mark in this task. Therefore, only 3.27% of the students who had done this task got 0 mark. The majority of the score distribution was at the basic level. 35.29% of the students got 0.5 to 2 marks. Besides, 25.24% of the students got 2.5 to 4 marks and 5.94% of the students got 4.5 to 6 marks. In other words, over 30% of the students could meet at least the proficient level.

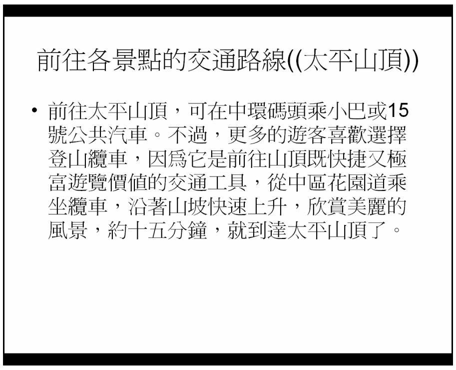
For special school students, the task was poorly performed but slightly better than that of the primary school students. The mean score was 1.09 and the standard deviation was 1.48. There were 31.82% of the students who did not reach the question or showed no response. Including those “not-reached” and “non-response” students, 45.45% of the students got 0 mark. The majority of the score distribution was at the basic level. 36.37% of the students got 0.5 to 2 marks. Besides, 13.64% of the students got 2.5 to 4 marks whereas 4.55% of the students got 5 marks in this task.

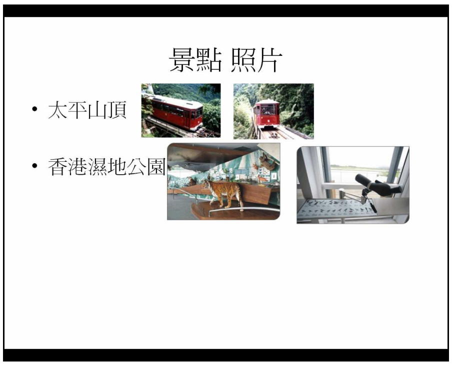
When comparing across the three school types, secondary school students performed much better than that of the primary and special school students in this task. Over 30% of the secondary school students attained at least the proficient level, whereas only 10.14% and 18.19% of the primary and special school students could reach at least the proficient level respectively. Furthermore, it was observed that there was a great difference among school levels in terms of the percentage of students who did not attempt the question. 53.21% of the primary school students made no response to this task or did not reach the question, whereas the percentages for the secondary and special school students were 30.24% and 31.82% respectively.

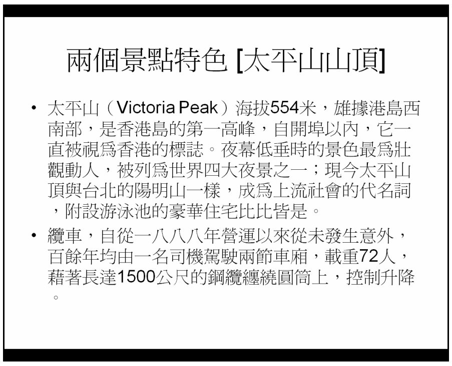
Here are some examples of students' answers at the advanced level.

*Advanced level*

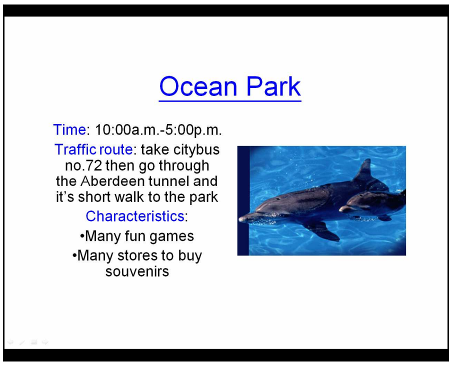


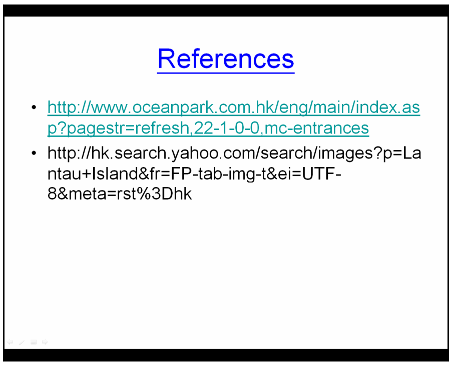




(Student: 124031)




(Student: 203041)

**Q3 Evaluate (6 marks)**

For "evaluate", students were asked to evaluate and retrieve appropriate information found on the Internet. Their overall performance in this task was also bad. It was observed that most students were used to copy a large amount of information from the Internet and paste it as their answers. Such information normally contained much irrelevant materials such as the history of or the time schedule of the scenic spots. Therefore, marks were deducted. Besides, some students might misunderstand the question and provided information of scenic spots outside Hong Kong, such as places in Japan or in Mainland China. Furthermore, it was found that the characteristics of scenic spots suggested by the students were commonly very simple, such as "It is a funny places" or "It is very large". This would be another area to lose marks for this indicator.

*Table 5.15 Percentage distribution of students of different school types for each score of Q3 (Evaluate) of Technical PA*

| **Score** | **Primary School (%)** | | **Secondary School (%)** | | **Special School (%)** | | **IL Competence Level** |
|---|---|---|---|---|---|---|---|
| 0.00 | 66.19 | 66.19 | 35.03 | 35.03 | 45.45 | 45.45 | Novice |
| 0.50 | 9.00 | 25.04 | 6.49 | 37.07 | 13.64 | 40.92 | Basic |
| 1.00 | 6.52 | | 11.80 | | 9.09 | | |
| 1.50 | 3.97 | | 9.45 | | 4.55 | | |
| 2.00 | 5.55 | | 9.33 | | 13.64 | | |
| 2.50 | 2.78 | 7.76 | 7.00 | 22.65 | 0.00 | 13.64 | Proficient |
| 3.00 | 2.47 | | 8.49 | | 4.55 | | |
| 3.50 | 1.46 | | 4.11 | | 0.00 | | |
| 4.00 | 1.05 | | 3.05 | | 9.09 | | |
| 4.50 | 0.46 | 1.01 | 2.47 | 5.23 | 0.00 | 0.00 | Advanced |
| 5.00 | 0.55 | | 2.32 | | 0.00 | | |
| 5.50 | 0.00 | | 0.28 | | 0.00 | | |
| 6.00 | 0.00 | | 0.16 | | 0.00 | | |
| Total | 100.00 | | 100.00 | | 100.00 | | |
| **Mean Score** | **0.57** | | **1.43** | | **1.00** | | |
| **(SD)** | **(1.03)** | | **(1.45)** | | **(1.31)** | | |
| **N** | **830** | | **823** | | **22** | | |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of both primary and secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

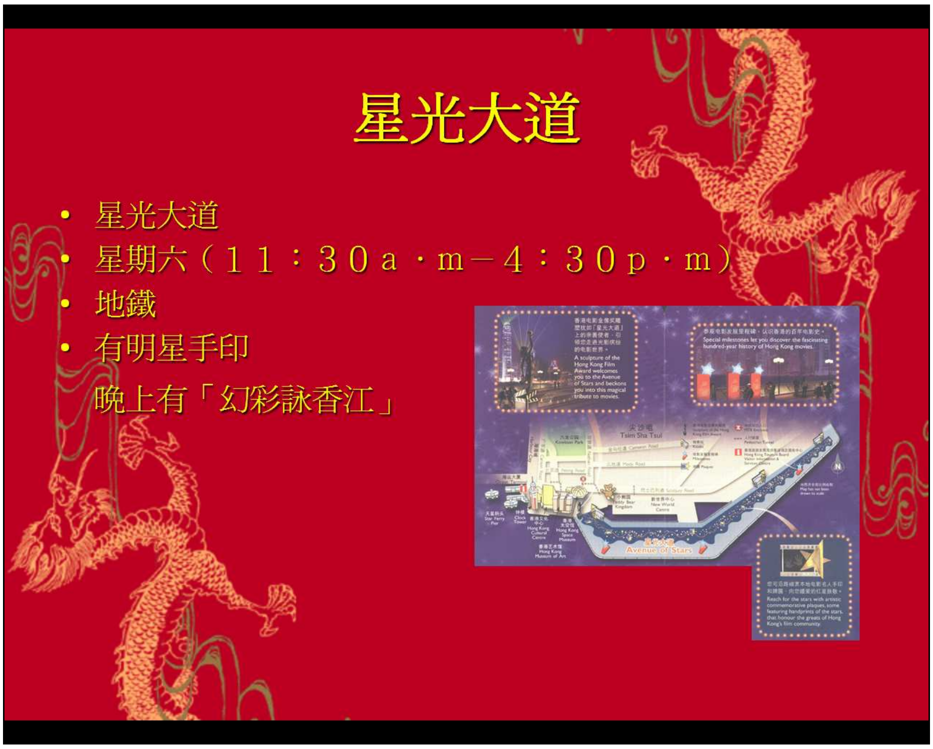
For primary school students, this task was poorly performed. The mean score was only 0.57 and the standard deviation was 1.03. There were 53.21% of the students who did not reach or made no response to this task. Including those "not-reached" and "non-response" students, 66.19% of the students got 0 mark. It implied that quite a lot of the primary school students did not have enough time to complete this task. Besides, 25.04% of the students got 0.5 to 2 marks and only 8.77% of the students got 2.5 to 5 marks in this task.

For secondary school students, their performance in this task was not good although the performance was the highest amongst the three school types. The mean score was 1.43 and the standard deviation was 1.45. 30.24% of them made no response or did not reach this question. Including those “not-reached” and “non-response” students, 35.03% of the students got 0 mark, 37.07% of the students got 0.5 to 2 marks and 27.88% of the students attained at least the proficient level and got 2.5 to 6 marks in this question. The majority of score for this task was at the basic level.

For special school students, their performance in this task was also bad, although it was slightly better than that of the primary school students. The mean score was 1 and the standard deviation was 1.31. 31.82% did not reach or made no response to this task. Including those “not-reached” and “non-response” students, 45.45% of the students got 0 mark. 40.92% of the students got 0.5 to 2 marks. Besides, 13.64% of the students got 2.5 to 4 marks and reached the proficient level. The majority of students were at the basic level. No student attained the advanced level.

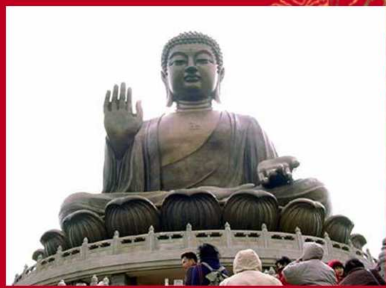
Here are some examples of students’ answers at the advanced level.

*Advanced level*



# 天壇大佛

- 天壇大佛
- 星期日（１２：００ｐ·ｍ－５：００ｐ·ｍ）
- 地鐵，巴士
- 大佛很雄偉
  可以參拜大佛



(Student: 106022)

## Time Arrangement

The first day : go to The Peak.
about 9:00 – 15:00
The second day : go to Lantau Island
about 9:00 – 18:00

## Traffic routes

For the Lantau Island :
First take the MTR to Tung Chung station, then follow signs to nearby Skyrail Terminal and take the cable car to Ngong Ping. Or, take bus 23 from the Tung Chung Bus Terminus to Ngong Ping.

For the Peak:
Central MTR Exit A, take footbridge to Exchange Square bus terminus and then bus 15 to The Peak, walk towards the harbor and the Star Ferry Pier. Take bus 15C to the Lower Peak Tram Station on Garden Road. Take the Peak Tram and get off at the Upper Peak Tram Station.

## Photos

## Characteristics

Lantau Island:
We can try Ngong Ping 360 there and see the giant Buddha.

The Peak:
There are green mountains and a easy path for the elderly, the air in there is fresh.

(Student: 203025)

**Q3 Create (6 marks)**

For "create", students were asked to use their own idea to design the layout of the slides in order to enhance the presentation. Their overall performance in this task was poor. The full marks should be 6 but the highest mark attained for this task was only 3 marks. It was observed that most students did not pay much effort into the layout of the PowerPoint, but only concentrated on the basic requirements of this question. Some students reported that they did not have enough time to finish Q3 and so they only focused on doing the basic requirements.

*Table 5.16 Percentage distribution of students of different school types for each score of Q3 (Create) of Technical PA*

| School Type | N | Score (%) | | | | | | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | .00 | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | | | |
| Primary | 830 | 86.70 | 11.69 | 1.41 | 0.21 | 0.00 | 0.00 | 0.00 | 100.00 | 0.15 | (0.41) |
| Secondary | 823 | 76.74 | 18.89 | 3.94 | 0.43 | 0.00 | 0.00 | 0.00 | 100.00 | 0.28 | (0.55) |
| Special | 22 | 77.27 | 18.18 | 4.55 | 0.00 | 0.00 | 0.00 | 0.00 | 100.00 | 0.27 | (0.55) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of both primary and secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

For primary school students, the performance was even worse when compared with that of the secondary school students. The mean score was 0.15 and the standard deviation was 0.41. 86.70% of the students got 0 mark, although amongst which, 53.21% either did not reach or made no response to this task. 13.1% of the students reached the basic level and got 1 to 2 marks. Only 0.21% of the students got 3 marks in this task.

For secondary school students, this task was poorly performed. The mean score was 0.28 and the standard deviation was 0.55. 76.74% of the students got 0 mark and around 30.24% of the students did not reach or showed no response to this task. 22.83% of the students reached the basic level and got 1 to 2 marks and only 0.43% of the students got 3 marks.

For special school students, the result was similar to that of the secondary school students. The mean score was 0.27 and the standard deviation was 0.55. 31.82% either did not reach or made no response to this task. Including those "not-reached" and "non-response" students, 77.27% of the students got 0 mark. 22.73% of the student got 1 to 2 marks and attained the basic level. No student got 3 marks or higher in this question.

Here are some examples of students’ answers at the proficient level.

*Proficient level*


(Student: 137018)


(Student: 229023)


(Student: 229023)

**Q3 Manage (1 mark)**

For "manage", students were asked to save the PowerPoint file into a proper folder. Their overall performance in this task was good.

*Table 5.17 Percentage distribution of students of different school types for each score of Q3 (Manage) of Technical PA*

| School Type | N | Score (%) | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|
| | | 0.00 | 1.00 | | | |
| Primary | 830 | 59.94 | 40.06 | 100.00 | 0.40 | (0.49) |
| Secondary | 823 | 31.53 | 68.47 | 100.00 | 0.68 | (0.46) |
| Special | 22 | 31.82 | 68.18 | 100.00 | 0.68 | (0.48) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of both primary and secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

For primary school students, their performance in this task was not bad, although there were only 40.06% of the students got full marks in this task. The reason was that a number of students could not reach or finish this question. If only students who could finish the task were counted, over 80% of the students could get full marks.

For secondary and special school students, the performances of this task were very good. 68.47% of the secondary school students and 68.18% of the special school students got full marks. Besides, quite a number of the students missed or did not reach this task (For details, please refer to Appendices 5.2 and 5.3). Therefore, apart from those who showed no response or did not reach this task, nearly 100% of the secondary and special school students could get full marks and save their files in to a correct folder.

### *5.4.2.8 Question 4*

For Q4, students were asked to share and discuss their suggestions on the scenic spots for their grandparents. Although their performance in this task was bad, the results might not reflect the real ability of the students. It was because a number of them did not reach or showed no response to this task. Most students spent too much time on Q3 and so did not have enough time for this question. Only 497 out of 1675 students had done this task. In other words, only around 30% of the total number of students had done this task.

*Table 5.18 Percentage distribution of students of different school types for each score of Q4 (Communicate) of Technical PA*

| School Type | N | Score (%) | | | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|---|---|
| | | .00 | 1.00 | 2.00 | 3.00 | | | |
| Primary | 830 | 92.34 | 5.90 | 1.76 | 0.00 | 100.00 | 0.09 | (0.35) |
| Secondary | 823 | 78.58 | 16.02 | 5.32 | 0.08 | 100.00 | 0.27 | (0.55) |
| Special | 22 | 68.18 | 27.27 | 4.55 | 0.00 | 100.00 | 0.36 | (0.58) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of both primary and secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

For primary school students, the task was poorly done. The mean score was 0.09 and the standard deviation was 0.35. It implied that most students got no mark in this task. In fact, over 90% (92.34%) of the students got 0 mark, although there were 75.69% of the students who did not reach or showed no response to this question. 5.9% of the students got 1 mark and only 1.76% of them got 2 marks. No primary school student got 3 marks in this task.

For secondary school students, their performance in this task was fairly acceptable when compared with that of the primary school students. The mean score was 0.27 and the standard deviation was 0.55. Although 78.58% of the students got 0 mark, there were 64.30% of them who did not reach or made no response to this question. 16.02% of the students got 1 mark and reached the basic level. 5.32% of them got 2 marks and 0.08% of them got 3 marks in this task.

For special school students, their performance in this task was better than that of the primary and secondary school students. The mean score was 0.36 and the standard deviation was 0.58. 68.18% of the students got 0 mark. However, there were 54.55% of the students who did not reach or showed no response to this question. 27.27% of them got 1 mark and 4.55% of the students got 2 marks. No one got 3 marks in this task.

Here are some examples of students' answers in Q4.

*Advanced level*

I suggest these 2 senic spots

-The Victoria Peak

-The Giant Buddha.

In the Peak, they can see the view of Hong Kong.It will be amazing and interesting.They can also take photos

In the Giant Buddha,many elderly likes to go to the religious places.They can see the Big Buddha and have a wonderful religious trip

(Student: 207021)

I agree with your opinion.
I think the Giant Buddha is a good senic spot
for the elderly.They may take part in this section because the place is wonderful!

(Student: 207021)

*Proficient level*

I chose Aberdeen & Victoria Harbour. The customers - grandparents are old, and they cannot walk for a long time. They can walk slowly in Aberdeen to see the beautiful scenery and enjoy tasty food there. They can watch the "symphony of lights" in the Victoria Harbour at 8:00pm. They can also walk along the harbour and enjoy the beautiful skyline of Victoria Harbour.

(Student: 203042)

因爲山頂景色迷人,晚上可以到一些有情調的地方吃飯。
而尖沙咀就可以買衫等等，也有地方吃飯

(Student: 122018)

I suggest The Peak , it is because the view from top to see is beautiful!

(Student: 204035)

因爲這些景點都是香港最有名的景點

(Student: 110017)

## 5.5 Students' Performance across Schools / Levels

In this section, we will explore students' performance across the primary schools and secondary schools and make comparisons between them. As only 4 special schools were involved in this study, no analysis was conducted across the special schools.

### 5.5.1 Primary School Students' Performance across Schools

Figure 5.3 shows the boxplots of the mean scores of primary school students' technical performance in the seven dimensions of IL across schools. It was observed that smaller dispersion was found in the dimensions of "create" and "communicate" and larger dispersion was found in the dimensions of "access" and "manage". There were outliers in the dimensions of "integrate", "evaluate" and "communicate". As shown in Figure 5.3, students from one school (school 124) demonstrated apparently better performance in the dimensions of "evaluate" and "integrate" compared to other schools. In the dimension of "communicate", students from 3 primary schools (110, 122 and 116) performed apparently better.

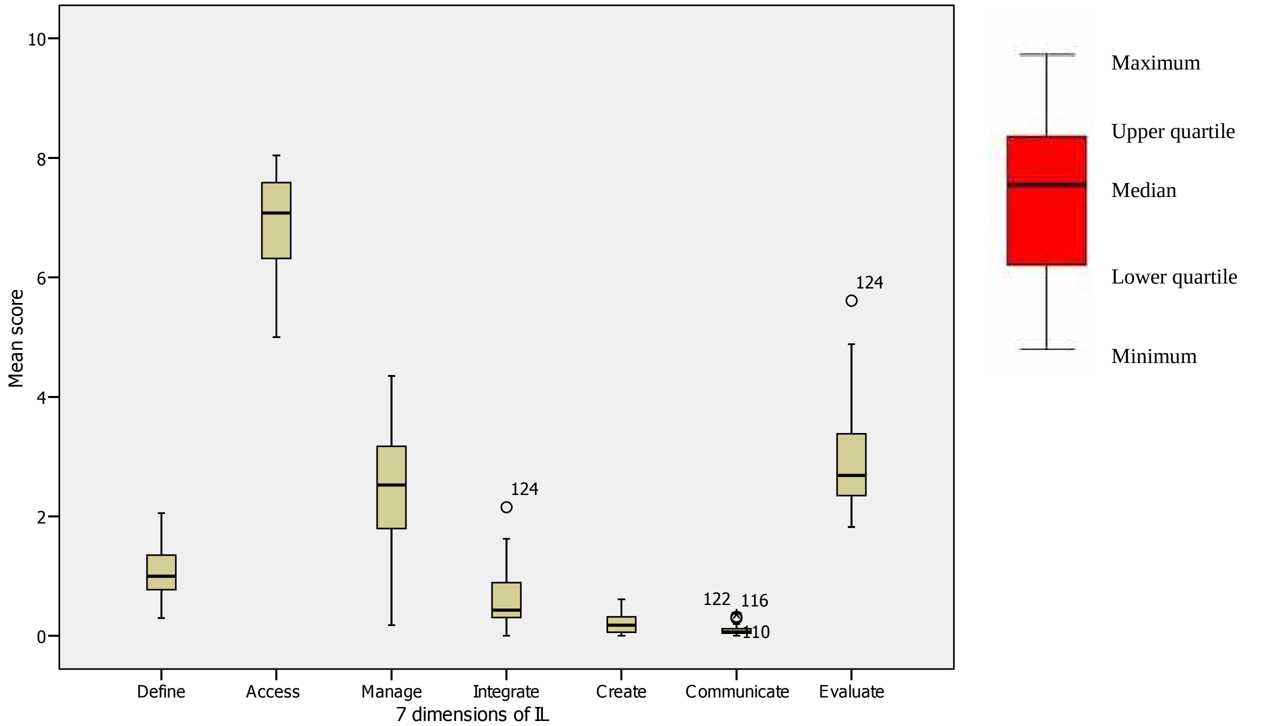



*Figure 5.3 Students' IL performance in Technical PA across primary schools*

When examining whether there was any significant difference in the 8 IL indicators of the Technical PA across primary schools, results from ANOVA as shown in Table 5.19 indicated that all dimensions and "total" score of the PA across primary schools were statistically significant, except the dimension of "communicate". One of the possibilities for the reason of insignificance in the dimension of "communicate" was that only a few students had attempted the question related to the "communicate" dimension. It was observed that the question of "communicate" was the last question and most primary school students did not reach this question before the end of the assessment. Only 203 out of 830 primary school students had attempted the question of "communicate".

*Table 5.19 ANOVA of 8 IL indicators across primary schools in Technical PA*

| IL Indicator | df | F | Sig. |
|---|---|---|---|
| Define | 39,790 | 2.73 | 0.00* |
| Access | 39,790 | 2.73 | 0.00* |
| Manage | 39,790 | 5.65 | 0.00* |
| Integrate | 39,790 | 5.23 | 0.00* |
| Create | 39,790 | 2.31 | 0.00* |
| Communicate | 39,790 | 1.39 | 0.06 |
| Evaluate | 39,790 | 5.75 | 0.00* |
| Total | 39,790 | 6.74 | 0.00* |

N.B. - Difference significant if Sig (p) <0.05.

### 5.5.2 Secondary School Students' Performance across Schools

Figure 5.4 shows the boxplots of the mean scores of the secondary school students' technical performance in the 7 dimensions across schools. It was observed that smaller dispersion was found in the dimensions of "define", "create" and "communicate" and larger dispersion was found in the dimension of "evaluate". There were outliers in the dimension of "communicate" and students from four schools (203, 211, 233 and 234) showed apparently better performance. There was also an outlier in the dimension of "manage" and students from one school (212) demonstrated apparently poorer performances.

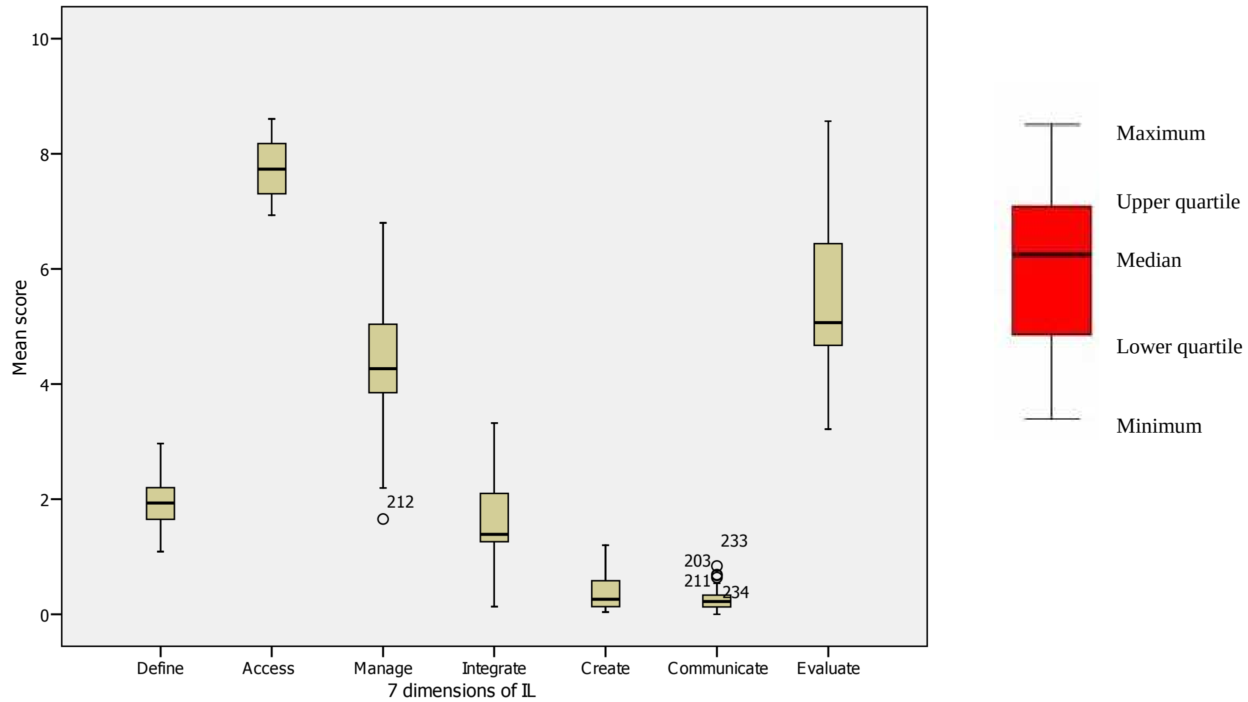



*Figure 5.4 Students' IL performance in Technical PA across secondary schools*

When examining whether there was any significant difference in the 8 IL indicators of the Technical PA across secondary schools, results from ANOVA as shown in Table 5.20 indicated that all 8 IL indicators in Technical PA across the secondary schools were statistically significant.

*Table 5.20 ANOVA of 8 IL indicators across secondary schools in Technical PA*

| IL indicator | df | F | Sig. |
|---|---|---|---|
| Define | 32,790 | 3.16 | 0.00* |
| Access | 32,790 | 2.46 | 0.00* |
| Manage | 32,790 | 12.03 | 0.00* |
| Integrate | 32,790 | 8.69 | 0.00* |
| Create | 32,790 | 6.05 | 0.00* |
| Communicate | 32,790 | 3.64 | 0.00* |
| Evaluate | 32,790 | 10.30 | 0.00* |
| Total | 32,790 | 11.66 | 0.00* |

N.B. - Difference significant if Sig (p) <0.05.

### 5.5.3 Comparing Students' Performance Between the Primary and Secondary Levels

When comparing the students' performance between the primary and secondary levels (Table 5.21), secondary school students had better performance in all the 8 IL indicators, particularly in the dimensions of "define", "manage" and "evaluate". Results from ANOVA (Table 5.22) indicated that the differences between primary and secondary schools in all the 8 IL indicators were statistically significant.

*Table 5.21 Mean scores of 8 IL indicators in Technical PA for 40 primary and 33 secondary schools*

| IL Indicator | School Type | N | Min | Max | Mean Score | (SD) | Full Score | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|---|
| Define | Primary | 40 | 0.29 | 2.05 | 1.06 | (0.44) | 3 | 35.33 |
| | Secondary | 33 | 1.09 | 2.97 | 1.90 | (0.42) | | 63.33 |
| Access | Primary | 40 | 5.00 | 8.04 | 6.89 | (0.80) | 9 | 76.56 |
| | Secondary | 33 | 6.93 | 8.60 | 7.73 | (0.51) | | 85.89 |
| Manage | Primary | 40 | 0.18 | 4.35 | 2.48 | (0.97) | 8 | 31.00 |
| | Secondary | 33 | 1.65 | 6.80 | 4.36 | (1.16) | | 54.50 |
| Integrate | Primary | 40 | 0.00 | 2.15 | 0.60 | (0.48) | 6 | 10.00 |
| | Secondary | 33 | 0.13 | 3.32 | 1.53 | (0.78) | | 25.50 |
| Create | Primary | 40 | 0.00 | 0.61 | 0.20 | (0.15) | 9 | 2.22 |
| | Secondary | 33 | 0.04 | 1.20 | 0.40 | (0.34) | | 4.44 |
| Communicate | Primary | 40 | 0.00 | 0.36 | 0.09 | (0.08) | 3 | 3.00 |
| | Secondary | 33 | 0.00 | 0.84 | 0.27 | (0.18) | | 9.00 |
| Evaluate | Primary | 40 | 1.82 | 5.61 | 3.00 | (0.90) | 12 | 25.00 |
| | Secondary | 33 | 3.22 | 8.56 | 5.45 | (1.37) | | 45.42 |
| Total | Primary | 40 | 8.21 | 21.04 | 14.32 | (3.19) | 50 | 28.64 |
| | Secondary | 33 | 14.22 | 30.27 | 21.64 | (3.96) | | 43.28 |

N.B. - N listed in the table is the unweighted number of schools.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are weighted statistics.

*Table 5.22 ANOVA of 8 IL indicators between the primary and secondary levels in Technical PA*

| IL indicator | df | F | Sig. |
|---|---|---|---|
| Define | 1,71 | 81.40 | 0.00* |
| Access | 1,71 | 36.96 | 0.00* |
| Manage | 1,71 | 73.67 | 0.00* |
| Integrate | 1,71 | 55.91 | 0.00* |
| Create | 1,71 | 21.92 | 0.00* |
| Communicate | 1,71 | 28.34 | 0.00* |
| Evaluate | 1,71 | 105.85 | 0.00* |
| Total | 1,71 | 102.87 | 0.00* |

N.B. - Difference significant if Sig (p) <0.05.

## 5.6 Comparing the Difficulty Levels of the Seven Dimensions of Information Literacy in Technical Performance Assessment

When comparing the difficulty levels of the 7 IL dimensions, the Project Team would like to point out the constraints in the design of the performance tasks in the Technical PA. Task related to the dimension of “communicate” was put in the last question of the PA. Thus, to a certain extent, this might affect students’ performance in answering this question. Therefore, in order to find out the difficulty levels of the 7 dimensions of IL in this assessment, Table 5.23 and Figure 5.5 show the mean scores of students who had actually attempted those questions in all school types. In other words, those students, who did not reach or made no response to the questions in the PA, were not taken into account. The Project Team would like to point out that as the full score of each IL dimension was not the same, only looking at the mean scores would not be sufficient for comparison to be made across dimensions. It would also be necessary to look at the mean score percentages for comparison purpose.

*Table 5.23 Mean scores of primary, secondary and special school students (excluding those "not-reached" and "non-response" students) across the 8 IL indicators of Technical PA*

| School Type | IL Indicator | N | Min | Max | Mean Score | (SD) | Full Score | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|---|
| Primary | Define | 830 | 0.00 | 3.00 | 1.08 | (1.22) | 3 | 36.02 |
| | Access | 830 | 0.00 | 9.00 | 6.89 | (2.27) | 9 | 76.51 |
| | Manage | 656 | 0.00 | 7.00 | 3.17 | (1.65) | 8 | 39.66 |
| | Integrate | 384 | 0.00 | 5.00 | 1.33 | (1.21) | 6 | 22.19 |
| | Create | 656 | 0.00 | 3.00 | 0.28 | (0.54) | 9 | 3.06 |
| | Communicate | 203 | 0.00 | 2.00 | 0.39 | (0.62) | 3 | 12.92 |
| | Evaluate | 830 | 0.00 | 9.50 | 3.03 | (1.94) | 12 | 25.28 |
| | Total | 830 | 0.00 | 31.50 | 14.44 | (6.34) | 50 | 28.88 |
| Secondary | Define | 822 | 0.00 | 3.00 | 1.92 | (1.21) | 3 | 63.88 |
| | Access | 823 | 0.00 | 9.00 | 7.78 | (1.71) | 9 | 86.47 |
| | Manage | 771 | 0.00 | 8.00 | 4.79 | (1.66) | 8 | 59.92 |
| | Integrate | 619 | 0.00 | 6.00 | 2.25 | (1.32) | 6 | 37.42 |
| | Create | 771 | 0.00 | 4.00 | 0.45 | (0.71) | 9 | 5.02 |
| | Communicate | 284 | 0.00 | 3.00 | 0.75 | (0.71) | 3 | 25.12 |
| | Evaluate | 822 | 0.00 | 12.00 | 5.52 | (2.55) | 12 | 46.01 |
| | Total | 823 | 0.00 | 39.00 | 21.88 | (6.92) | 50 | 43.75 |
| Special | Define | 22 | 0.00 | 3.00 | 1.82 | (1.26) | 3 | 60.61 |
| | Access | 22 | 3.00 | 9.00 | 6.82 | (1.56) | 9 | 75.76 |
| | Manage | 18 | 1.00 | 7.50 | 3.64 | (2.30) | 8 | 45.49 |
| | Integrate | 15 | 0.00 | 5.00 | 1.60 | (1.55) | 6 | 26.67 |
| | Create | 18 | 0.00 | 3.00 | 0.44 | (0.78) | 9 | 4.94 |
| | Communicate | 10 | 0.00 | 2.00 | 0.80 | (0.63) | 3 | 26.67 |
| | Evaluate | 22 | 0.00 | 10.00 | 3.91 | (3.01) | 12 | 32.58 |
| | Total | 22 | 8.00 | 33.50 | 17.34 | (6.75) | 50 | 34.68 |

N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" of both primary and secondary schools are weighted statistics.

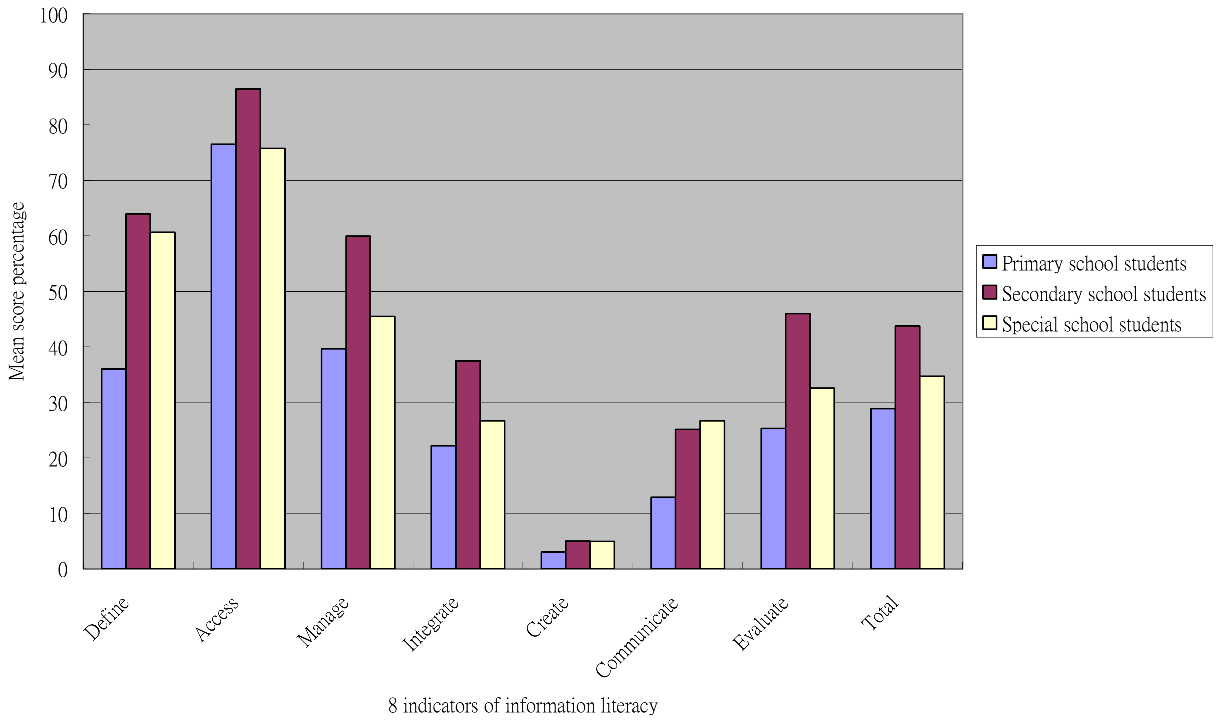



*Figure 5.5 Mean score percentages of primary, secondary and special school students (excluding those "not-reached" and "non-response" students) in the 8 IL indicators of Technical PA*

Figure 5.5 shows that the dimensions of "access", "define" and "manage" were the 3 dimensions with the highest mean score percentages and "communicate" and "create" were the 2 dimensions with the lowest mean score percentages. Secondary school students had better performance in all dimensions of IL, except the dimension of "communicate". It was interesting to note that special school students had better performance than secondary school students in the dimension of "communicate". In other words, special school students might be better in communication with the use of technology.

When comparing the mean score percentages of students in both primary and secondary schools, it was found that there was a great difference in the dimensions of "define", "manage" and "evaluate".

## 5.7 Summary

### 5.7.1 Students' Information Literacy Competences in Technical Performance Assessment

#### *5.7.1.1 Students' performance in the 7 IL dimensions of Technical PA*

Results from the PA indicated that students had good performance in the dimensions of "define", "access" and "manage". In the dimension of "access", the mean score percentage was over 75% for students of all school types. On the other hand, poor performance was found in the dimensions of "communicate" and "create". For the dimension of "communicate", one of the reasons for the poor performance was that the task of "communicate" was in the last question of the assessment. Students might not have enough time to reach the last question and could not answer the question. Nevertheless, mean score percentage found in the dimension of "create" was only less than 5%.

#### *5.7.1.2 Quality of information search*

It was found that all students had very good performance in the dimension of "access". Students could access useful and accurate information on the Internet. For secondary school students, the mean score percentage of "access" was nearly 90%. In other words, almost all secondary school students could access the information on the Internet and provide correct answers in the tasks of "access" in the assessment. Besides, the mean score percentage of "access" was over 70% for the primary and special school students.

#### *5.7.1.3 Creativity*

It was found that all students had very poor performance in the dimension of "create". It was observed that students paid much attention to the tasks which were clearly defined. For those tasks which required students to use their own ideas to create, students did not seem to put much effort into them.

#### *5.7.1.4 Difference between primary and secondary school students in terms of information literacy*

It was found that there was a great difference between the performance of primary and secondary school students in "define" and "evaluate" dimensions. For "define", the mean score percentages for the primary and secondary schools were 36% and 63.67% respectively and for "evaluate", the mean score percentages for the primary and secondary schools were 25.25% and 46% respectively.

#### *5.7.1.5 Use of communication tools for meaningful discussion*

It was interesting to note that special school students had better performance in the dimension of "communicate" than that of the secondary school students. In other words, special school students displayed higher ability in using online communication tools for communication.

## 5.8 Recommendations

### 5.8.1 Skills of Communication and Creativity

Findings from the PA indicated that students were particularly weak in “create”. It was observed that students were not used to answer questions with their own ideas. Encouragement and training is needed for students to improve the skill of creativity. Besides, findings from the PA indicated that there was still room for improvement in the dimension of “communicate”.

### 5.8.2 Skills of Generalization and Interpretation

Findings from the PA also indicated that there was still room for primary school students to improve in the dimensions of “define”, “integrate” and “evaluate”. The results showed that primary school students were weak in generalization and interpretation skills. Therefore, training needs to be provided to improve students’ reasoning and generalization skills.

# Chapter 6 Findings on Chinese Language Performance Assessment

The Chinese Language Performance Assessment (PA) assessed students' information literacy (IL) competence at Primary 5 (P5) and Secondary 2 (S2) levels. Two performance assessments were designed to cater for the differences of the two student groups. This chapter reports and analyses P5 and S2 students' performance in Chinese Language PA in 8 sections, including "description of the assessment tasks", "task completion", "students' overall performance in information literacy of Chinese Language Performance Assessment", "students' performance at item level", "students' performance across schools", "comparing the difficulty levels of the seven dimensions of information literacy in Chinese Language Performance Assessment", "summary" and "recommendation".

## 6.1 Description of the Assessment Tasks

This section presents the content and structure of the two PAs for students at P5 and S2 levels respectively. The total scores for both assessments were 50. Students were required to complete the assessment within 45 minutes. To assist students to complete these tasks, useful linkages to relevant websites were provided, e.g. search engines, encyclopedias, electronic dictionaries and database for Chinese classics. All assessment items were designed in accordance with the rubrics of IL framework of the former Education and Manpower Bureau, which covers seven IL dimensions, namely "define", "access", "manage", "integrate", "evaluate", "create" and "communicate".

### 6.1.1 Primary 5 Chinese Language Performance Assessment

The scenario of the P5 PA was a teacher asking students to submit a project on the Chung Yeung Festival. The total score of the assessment was 50. There were a total of four main questions in the PA. The definitions of the 7 IL dimensions, a brief description of each task and the score distribution of these assessment tasks are presented as follows.

"Define" is defined as 'the ability to use ICT tools to identify and appropriately define the information needed to tackle the problem/task.' The "define" dimension carried 3 marks in this PA. Question (Q) 1.2 assessed students' competence in the "define" dimension. It asked students to use appropriate keywords to search for information about traditional Chinese festivals. In order to complete this task, P5 students needed to first define the problem and then identified the information needed for this question.

"Access" is defined as 'the ability to collect and/or retrieve information. This includes the ability to identify likely digital information sources and to get the information from those sources.' The "access" dimension carried 14 marks in this PA. Q1.1, which required students to access the Internet for appropriate information about traditional Chinese Festivals and match the festivals with respective customs, carried 10 marks. Q4 required students to use the resources from the Internet and find out the origin of the Chung Yeung Festival, the custom for this festival, festive food and website addresses for reference purposes. 4 marks would be given upon successful completion of Q4.

“Manage” is defined as ‘the ability to apply an existing organizational or classification scheme for digital information’. The “manage” dimension carried 6 marks in this PA. Q1.1, which required students to organize the information collected and arrange the festivals in chronological order, carried 4 marks. In addition, both Q1.1 and Q4 required students to save their works into ‘My Documents’ folder with correct file names. In this respect, 1 mark would be given to Q1.1 and Q4 respectively.

“Integrate” is defined as ‘the ability to interpret and represent digital information. This includes the ability to use ICT tools to synthesize, summarize, compare and contrast information from multiple digital sources.’ The “integrate” dimension carried 7 marks in this PA. Q2 required students to select and integrate information about「茱萸」and clearly present the main points. 2 marks would be given to this question. Q4 required students to categorize the information collected, give a title to each category and put the information under the same category or within the same page. 2 marks would be given for the categorization. The appropriateness of the information collected for the target readers carried 3 marks.

“Evaluate” is defined as ‘the ability to determine the degree to which digital information satisfies the need of the task in ICT environments. This includes the ability to judge the quality, relevance, authority, point of view/bias, currency, coverage and accuracy of digital information.’ The “evaluate” dimension carried 6 marks in this PA. Q3 provided students with an article and required them to find out and correct three mistakes with the help of search engines. This task assessed students’ ability on judging the accuracy of digital information.

“Create” is defined as ‘the ability to generate information by adapting, applying, designing, or inventing information in ICT environment’. The “create” dimension carried 7 marks in this PA. Q1.1 required students to create a table to categorize the different festivals and respective customs. 2 marks would be given upon the completion of this task. Q4 required students to make use of special effects, e.g. font styles, colors, background, to enhance the presentation of their PowerPoint file. 5 marks would be given for the skillful use of these special effects.

“Communicate” is defined as ‘the ability to communicate information properly in its context of use for ICT environment. This includes the ability to gear electronic information for a particular audience and communicate knowledge in the appropriate venue.’ The “communicate” dimension carried 7 marks in this PA, including 1 mark for the correct input of an email recipient, 2 marks for a clearly defined subject, 2 marks for adopting an appropriate format and style and clearly present the identity of the recipient and sender, 2 marks for applying an appropriate register and standard written Chinese when communicating with teachers.

Table 6.1 provides a brief description of each task and the distribution of the seven IL dimensions in this assessment accordingly.

*Table 6.1 Task description and IL dimensions of P5 Chinese Language PA*

| Brief description of the Question | | Question requirement | IL Dimensions | Highest Competence Level Attained | Score |
|---|---|---|---|---|---|
| 1 | 1.1 Students were required to use the information found in the Internet and appropriate software to create a table matching the festivals with their respective customs and arrange these festivals in chronological order. | Able to match the customs with corresponding festivals correctly. | Access | Advanced | 10 |
| | | Able to name the file as 「節日習俗」 and save it in the 'My Documents' folder. | Manage | Basic | 1 |
| | | Able to arrange all the festivals chronologically starting from the Spring Festival. | Manage | Proficient | 2 |
| | | Able to design an appropriate title for the table. | Manage | Proficient | 2 |
| | | Able to create a table to categorize the different customs. Also, present the different "customs" and "festivals" in two separate groups. | Create | Proficient | 2 |
| | 1.2 Students were required to use appropriate keywords | Able to use appropriate keywords to search for information. | Define | Advanced | 3 |
| 2 | Students were required to write an email to report to a teacher the meanings for the phrase「茱萸」, the radicals and homonyms of the two words and finally to request for the teacher's comments. An appropriate register and standard written Chinese should be adopted. | Able to fill in the email recipient correctly. | Communicate | Basic | 1 |
| | | Able to fill in an explicit subject for the email. | Communicate | Proficient | 2 |
| | | Able to adopt an appropriate email format and style and clearly present the identity of the recipient and sender. | Communicate | Proficient | 2 |
| | | Able to communicate with teachers using appropriate register and standard written Chinese. | Communicate | Proficient | 2 |
| | | Able to integrate main points of the information collected and express them clearly. | Integrate | Proficient | 2 |
| 3 | Students were required to compare the information collected with the passage provided and correct mistakes in the passage. | Able to compare information obtained from the Internet with the passage provided and correct all the mistakes in the passage. | Evaluate | Advanced | 6 |

*Table 6.1 Task description and IL dimensions of P5 Chinese Language PA (Continued)*

<table>
<tr><th colspan="2">Brief description of the Question</th><th>Question requirement</th><th>IL Dimensions</th><th>Highest Competence Level Attained</th><th>Score</th></tr>
<tr><td rowspan="5">4</td><td rowspan="5">Students were required to collect texts and pictures about the Chung Yeung Festival, making use of search engines or other online instrument and then create PowerPoint slides for Primary 3 (P3) students.</td><td>Able to search for the origins, customs, festive food for the Chung Yeung Festival and create a PowerPoint file, citing all references.</td><td>Access</td><td>Advanced</td><td>4</td></tr>
<tr><td>Able to name the PowerPoint file as 「重陽節」 and save it in the 'My Documents' folder.</td><td>Manage</td><td>Basic</td><td>1</td></tr>
<tr><td>Able to use titles to categorize information, to allocate similar information under the same title or within the same page.</td><td>Integrate</td><td>Proficient</td><td>2</td></tr>
<tr><td>Able to integrate all the information collected to make PowerPoint slides, taking into consideration the literacy level and interests of the target readers (P3 students), instead of simply cutting and pasting information from the original source.</td><td>Integrate</td><td>Advanced</td><td>3</td></tr>
<tr><td>Able to make use of special effects, including font styles, colors, background, audio effects, pictures, animations and/ or slide transitions.</td><td>Create</td><td>Advanced</td><td>5</td></tr>
</table>

### 6.1.2 Secondary 2 Chinese Language Performance Assessment

There were totally five main questions in the secondary Chinese Language PA with the total score for this assessment being 50. The definition for the 7 IL dimensions is similar to those presented in the previous section for P5 Chinese Language PA. The description of the questions designed to assess students' competence in the 7 IL dimensions are presented in this section.

The "define" dimension carried 2 marks in this PA. Q3.3 required students to jot down all the keywords used during the information search; the purpose of this question was to find out whether S2 students could identify simple and accurate words and use it to look for the meaning of the Chinese word in this question.

The "access" dimension carried 12 marks in this PA, which also made up the biggest share among the 7 IL dimensions. Q1 (6 marks) required students to match literature works with their corresponding dynasties; Q2 (4 marks) assessed students' ability of using online resources to look for pronunciations of Chinese words, make comparisons with other words with similar pronunciation and choose the correct answer; Q3.2 (2 marks) required students to write down addresses of the websites they used while searching for answers. The purpose of this question was to find out whether S2 students were able to use appropriate online dictionaries to look for meanings of the Chinese word.

The “manage” dimension, including Q1 and Q5, carried 9 marks in this PA. Q1 (7 marks) required students to arrange all the dynasties chronologically from the earliest to the latest in one table and name the file as 「文學作品」 (Literature works). The purpose of this task was to assess students’ competence in managing digital information with existing methods. Q5 (2 marks) required students to give appropriate titles to the information in the PowerPoint file, name the PowerPoint file as 「買櫝還珠」 and save it in the ‘My Documents’ folder.

The “integrate” dimension carried 10 marks in this PA. Q4 (4 marks) required students to summarize and report the morals of the story「買櫝還珠」 and request comments from the teacher. Q5 (6 marks) required students to create a PowerPoint file with complete content. It should include the actual content of the story「買櫝還珠」and its moral (2 marks). Besides, students were asked to select, filter and integrate information so that the PowerPoint file created would be appropriate for the target readers (P3 students) (4 marks).

The “evaluate” dimension carried 6 marks in this PA. Q3.1 (6 marks) required students to choose from the dictionary one or more than one meanings of a Chinese word in order to match with the scenario in the question.

The “create” dimension carried 6 marks in this PA. Q1 (2 marks) required students to create a table to match the literature works with the corresponding dynasties. Q5 (4 marks) required students to use special effects, e.g. font styles, color, background, to enhance the presentation of their PowerPoint file.

The “communicate” dimension carried 5 marks in this PA. Q4 required students to write an email, in which 1 mark would be awarded for the correct input of the email recipient; another 1 mark would be awarded for an explicitly stated email subject, another 2 marks would be awarded for adopting appropriate register and standard written Chinese when communicating with teachers.

The above question descriptions were presented using the IL dimensions as an outline. Table 6.2 provides a brief description of each task and the distribution of the seven IL dimensions in this assessment accordingly.

*Table 6.2 Task description and IL dimensions of S2 Chinese Language PA*

| Brief description of the Question | | Question requirement | IL Dimensions | Highest Competence Level Attained | Score |
|---|---|---|---|---|---|
| 1 | Students were required to use the information found in the Internet and appropriate software to create a table and match the different literature works with their corresponding dynasties. | Able to match literature works with their corresponding dynasties. | Access | Advanced | 6 |
| | | Able to arrange in a table all the dynasties chronologically from the earliest to the latest. | Manage | Advanced | 4 |
| | | Able to produce an appropriate title for the table. | Manage | Proficient | 2 |
| | | Able to create a table and categorize literature works and dynasties into two sections | Create | Proficient | 2 |
| | | Able to name the file as 「文學作品」(Literature works) and save it in the 'My Documents' folder. | Manage | Basic | 1 |
| 2 | Students were required to use online dictionaries to look for pronunciations of Chinese words and compare it with other characters with similar pronunciation so as to choose a correct answer. | Able to check the pronunciations for the options in the question with online Cantonese Pronunciation dictionaries and choose a correct answer. | Access | Proficient | 4 |
| 3 | Q3.1 required students to define the meaning of the word 「釋」 within a particular sentence among all the different meanings of the word in the dictionary. | Able to explain the meaning of the word 「釋」 in 3 different contexts correctly. | Evaluate | Advanced | 6 |
| | Q3.2 required students to look for the meaning of the word using appropriate online dictionaries. | Able to look for the meaning of the word using appropriate online dictionaries. | Access | Proficient | 2 |
| | Q3.3 required students to identify correct and simple words and use it to look for the meanings of the word in dictionaries. | Able to identify correct and simple words and use it to look for the meaning of the word in dictionaries. | Define | Proficient | 2 |

*Table 6.2 Task description and IL dimensions of S2 Chinese Language PA (Continued)*

| Brief description of the Question | | Question requirement | IL Dimensions | Highest Competence Level Attained | Score |
|---|---|---|---|---|---|
| 4 | Students were required to write an email to teachers to report the morals of the story 「買櫝還珠」 and at the end request teachers' comments. An appropriate register and standard written Chinese should be adopted. | Able to include two main points: "morals of the story" and "request for teachers' comments". | Integrate | Proficient | 2 |
| | | Able to induce the morals of the story 「買櫝還珠」 completely and report it to teachers in an email. | Integrate | Proficient | 2 |
| | | Able to fill in the email recipient correctly. | Communicate | Basic | 1 |
| | | Able to fill in the subject of the email explicitly. | Communicate | Basic | 1 |
| | | Able to adopt an appropriate email format and style and clearly present the identity of recipient and sender. | Communicate | Basic | 1 |
| | | Able to communicate with teachers with appropriate register and standard written Chinese. | Communicate | Proficient | 2 |
| 5 | Students were required to use appropriate text, pictures and special effects to create a PowerPoint about the 「買櫝還珠」story , which would be used as teaching materials to P3 students. | Able to use special effects to create a PowerPoint file, e.g. font styles, colors, audio effects, pictures, animations and/or slide transitions. | Create | Advanced | 4 |
| | | Able to include the complete story in the PowerPoint, starting with retelling the story of「買櫝還珠」, followed by stating its morals. | Integrate | Proficient | 2 |
| | | Able to integrate all the information collected to make PowerPoint slides, taking into consideration the literacy level and interests of the target readers (P3 students), instead of simply cutting and pasting information from the original source. | Integrate | Advanced | 4 |
| | | Able to use titles to manage the content of the PowerPoint file. | Manage | Basic | 1 |
| | | Able to name the PowerPoint file as 「買櫝還珠」 and save it in the 'My Documents' folder. | Manage | Basic | 1 |

## 6.2 Task Completion

### 6.2.1 Primary Schools

There were altogether 825 P5 students participated in this assessment. Figure 6.1 shows the task completion rates. Most students were able to complete Q1.2, Q2 and Q3. However, there were 24.61% and 35.22% of the students who did not respond to Q1.1 and Q4 at all. For detailed information, please refer to Appendix 6.1.

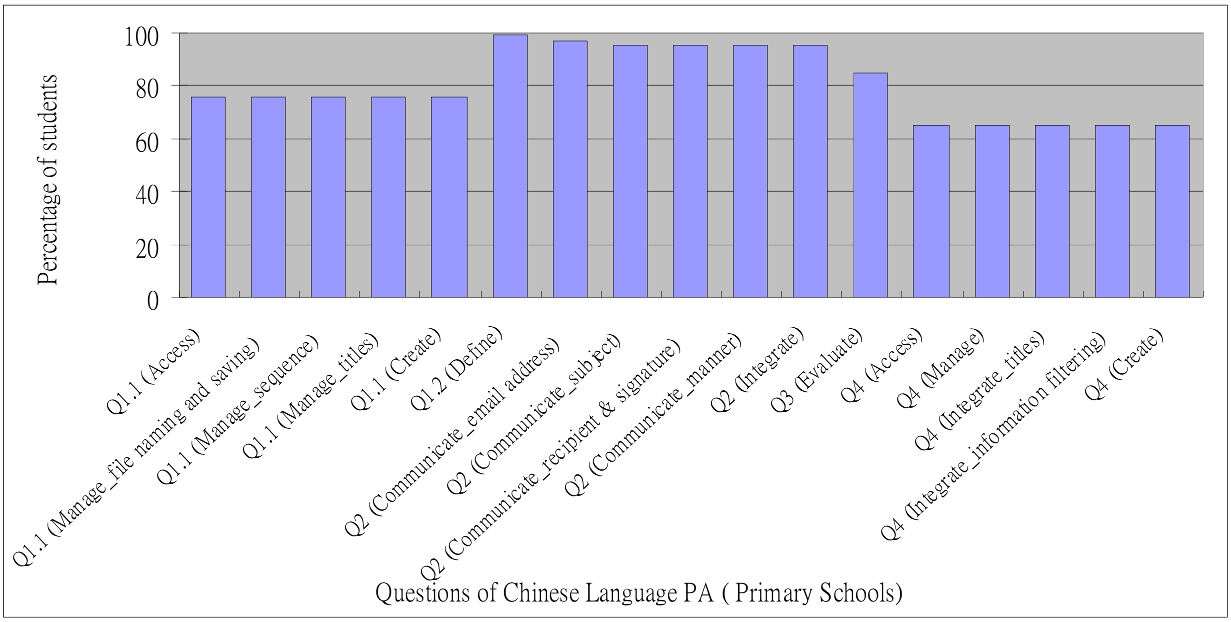



*Figure 6.1 Percentages of primary school students in completing the tasks of Chinese Language PA*

As the above figure indicates, a substantial percentage of students were unable to complete Q4 – creating a PowerPoint file, probably because they did not have enough time left for this task. Also, Q1.1 had rather low response rate probably because some students did not answer questions following the order in the PA, instead, they strategically selected and answered those questions that seemed to be easier first. It was likely that they considered Q1.1 difficult and intended to answer it at the end, but eventually they had no time left for it. In addition, this relatively low response rate to Q1.1 could result from unfamiliarity to the use of software like Excel and Word or failure to save the file at the end after completing the task.

### 6.2.2 Secondary and Special Schools

There were altogether 844 S2 students participated in this assessment, among which 24 students were from special schools. Figure 6.2 and 6.3 show the task completion rates of secondary schools and special schools. Most students were able to complete Q1 to Q4. For Q2 to Q4, special school students had similar response rates as that of secondary schools, but their response rate to Q1 was much lower. About 30% of the students did not respond to Q1. As for Q5, a number of students left it blank (34.50% of the secondary school students and 54.17% of special school students). The reason might be that they did not have enough time left to answer this question. Table 6.4 presents students' response rates of each item. For detailed response rates of secondary schools and special schools, please refer to Appendices 6.2 and 6.3.

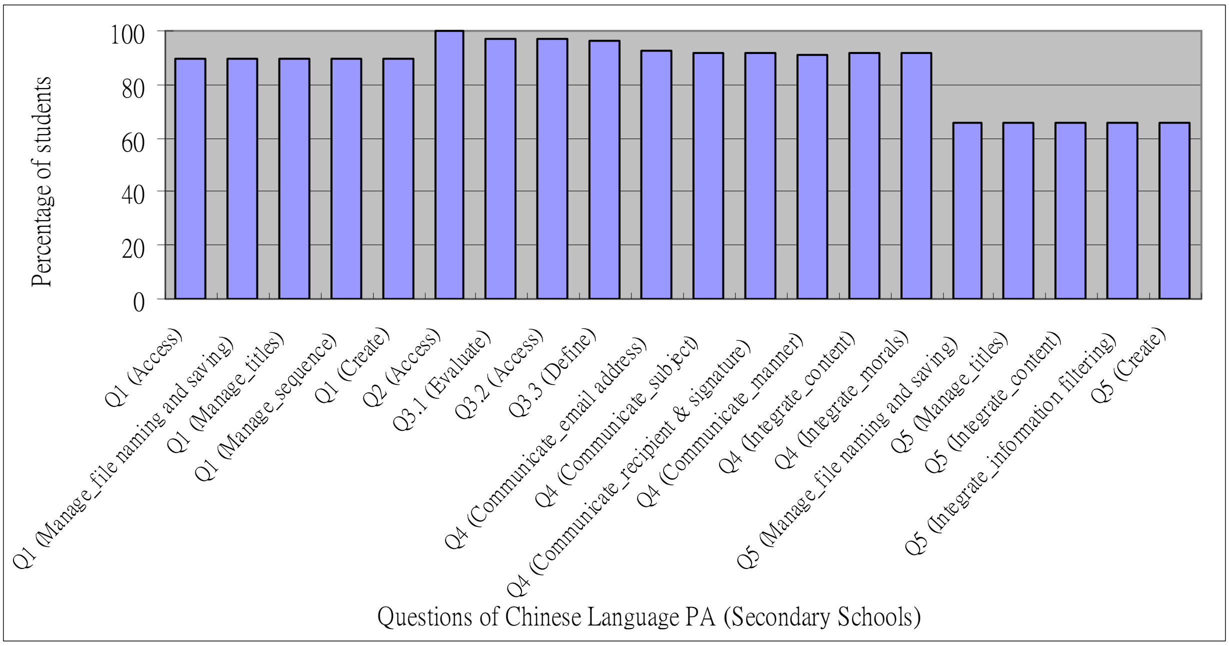



*Figure 6.2 Percentages of secondary school students in completing the tasks of Chinese Language PA*

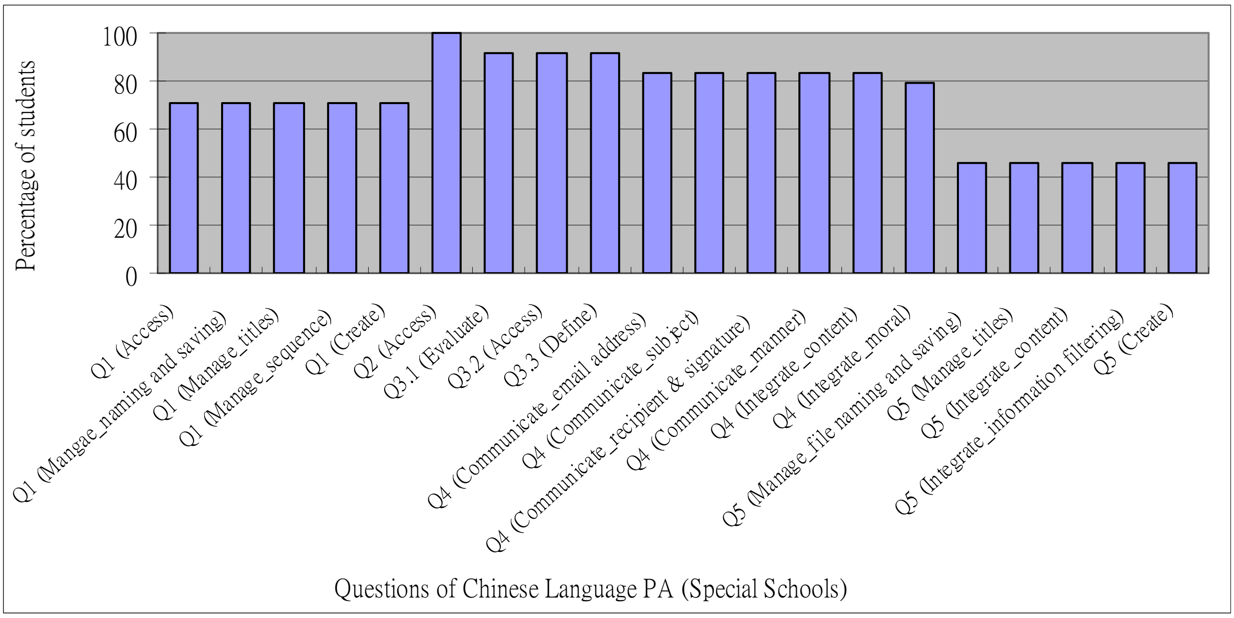



*Figure 6.3 Percentages of special school students in completing the tasks of Chinese Language PA*

## 6.3 Students’ Overall Performance in Information Literacy of Chinese Language Performance Assessment

There were 825 primary school students, 820 secondary school students and 24 special school students participated in this assessment. For primary and secondary schools, weighted statistics were used to analyze students’ performance. Due to the small sample size, unweighted statistics for special school students were used. As the full score of different dimension was not the same, it would be difficult to compare students’ performance using mean scores only. Therefore, mean score percentage (Mean ÷ Full score×100%) on each item was used when comparing students’ performance among different dimensions. The total score percentage of each question (added up to a total of 100%) showed students’ mean scores out of 100 marks. Students’ overall performance was rated as very good when the mean score percentage was 70% or above, good when the mean score percentage was between 60% and 70%, satisfactory when the mean score percentage was between 50% and 60%, fair when the mean score percentage was between 40% and 50%, below average when the mean score percentage was between 30% and 40%, poor when the mean score percentage was between 20% and 30% and as very poor the mean score percentage was below 20%. In the following section, primary school students’ performance will be reported first, followed by that of secondary and special schools.

### 6.3.1 Primary Schools

P5 students’ overall performance in this assessment was below average. The “total” mean score was 17.58 out of 50. The mean score percentage for “total” was 35.16% (SD=10.07). The maximum “total” score for primary 5 students was 45 and the lowest was 0. Table 6.3 reports students’ performance in the 8 IL indicators with below average performance in most of the IL dimensions. Students’ performance in the “define” dimension was fair, with the mean score percentage of 46.33%. When compared with other indicators, P5 students had the best performance in the “define” dimension, followed by “create”, “manage” and “integrate”. Students’ performance in these three IL dimension were below average with the mean score of above 36.50%. Students’ worst performance was found in the “access” dimension with the mean score percentage of 31.21%, which was below average.

*Table 6.3 Mean scores of primary school students in 8 IL indicators of Chinese Language PA*

| IL Indicator | Full Score (b) | Minimum (Min) | Maximum (Max) | Mean Score (a) | (SD) | Mean Score Percentage (%) (a)/(b) x 100% |
|---|---|---|---|---|---|---|
| Define | 3 | 0 | 3 | 1.39 | (0.95) | 46.33 |
| Access | 14 | 0 | 14 | 4.37 | (3.73) | 31.21 |
| Manage | 6 | 0 | 6 | 2.20 | (1.80) | 36.73 |
| Integrate | 7 | 0 | 7 | 2.58 | (2.04) | 36.67 |
| Communicate | 7 | 0 | 7 | 2.39 | (1.60) | 34.14 |
| Create | 7 | 0 | 7 | 2.58 | (2.10) | 36.86 |
| Evaluate | 6 | 0 | 6 | 2.07 | (2.29) | 34.50 |
| Total | 45 | 0 | 50 | 17.58 | (10.07) | 35.16 |

N=825
N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are weighted statistics.

### 6.3.2 Secondary Schools and Special Schools

Secondary school students performed much better than special school students in all IL dimension. Secondary school students' overall performance in this assessment was fair. The "total" mean score was 22.26 out of 50. The mean score percentage for the "total" score was 44.52% (SD=9.69). The maximum "total" score for secondary school students was 44 and the lowest was 0. Table 6.4 presents secondary school students' performance in the 8 IL indicators, with students' performance ranged from below average to satisfactory in most of the IL dimensions.

Special school students' overall performance in this assessment was poor. The "total" mean score of special school students was 12.88 out of 50. The mean score percentage for the "total" score was 25.76% (SD=9.33). The maximum "total" score for special school students was 35 and the lowest was 0. Table 6.5 presents special school students' performance in the 8 IL indicators, with students' performance ranged from very poor to below average in most of the IL dimensions.

Among the 7 IL dimensions, both groups of students performed better in "manage", "define" and "access". The performance of secondary school students was satisfactory with the mean score percentages of these three IL dimensions being 56.77%, 56.00% and 52.75% respectively. Special school students achieved the mean score percentages of 38.44%, 35.50% and 31.25% respectively for these three IL dimensions. Although these percentages were considered to be relatively low, special schools students' performance in these three IL dimensions was satisfactory when compared with other IL dimensions.

Among the 7 IL dimensions, both groups of students had the poorest performances in the "integrate" and "evaluate" dimensions. Secondary school students had below average performance in the "integrate" and "evaluate" dimensions. They performed the poorest in the "integrate" dimension, with mean score percentage of 30.30%, followed by the "evaluate" dimension, with mean score percentage of 36.00%. Special school students had very poor performance in the "evaluate" and "integrate" dimensions. They performed poorly in the "evaluate" dimension, with mean score percentage of 9.00%, followed by the "integrate" dimension, with mean score percentage of 15.40%.

*Table 6.4 Mean scores of secondary school students in 8 IL indicators of Chinese Language PA*

| **IL Indicator** | **Full Score** | **Min** | **Max** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|
| Define | 2 | 0 | 2 | 1.12 | (0.76) | 56.00 |
| Access | 12 | 0 | 12 | 6.33 | (3.26) | 52.75 |
| Manage | 9 | 0 | 9 | 5.11 | (2.79) | 56.77 |
| Integrate | 9 | 0 | 10 | 3.03 | (2.56) | 30.30 |
| Communicate | 5 | 0 | 5 | 2.00 | (1.43) | 40.00 |
| Create | 6 | 0 | 6 | 2.51 | (1.42) | 41.83 |
| Evaluate | 6 | 0 | 6 | 2.16 | (1.73) | 36.00 |
| Total | 44 | 0 | 50 | 22.26 | (9.69) | 44.52 |

N=820

N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are weighted statistics.

*Table 6.5 Mean scores of special school students in 8 IL indicators of Chinese Language PA*

| **IL Indicator** | **Full Score** | **Min** | **Max** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|
| Define | 2 | 0 | 2 | 0.71 | (0.86) | 35.50 |
| Access | 11 | 0 | 12 | 3.75 | (3.18) | 31.25 |
| Manage | 9 | 0 | 9 | 3.46 | (2.84) | 38.44 |
| Integrate | 5 | 0 | 10 | 1.54 | (1.72) | 15.40 |
| Communicate | 4 | 0 | 5 | 1.33 | (1.17) | 26.60 |
| Create | 4 | 0 | 6 | 1.54 | (1.22) | 25.67 |
| Evaluate | 6 | 0 | 6 | 0.54 | (1.41) | 9.00 |
| Total | 35 | 0 | 50 | 12.88 | (9.33) | 25.76 |

N=24

N.B. - N listed in the table is the unweighted number of students
- "Mean score", "SD", "Mean Score Percentage (%)" are unweighted statistics.

## 6.4 Students' Performance at Item Level

This section presents students' performance in different questions. For primary and secondary schools, weighted statistics were used to analyze students' performance. Due to the small sample size, unweighted statistics for special school students were used. Mean score percentage on each item was used when comparing students' performance among different dimensions. Students' overall performance was rated as very good when the mean score percentage was 70% or above, good when the mean score percentage was between 60% and 70%, satisfactory when the mean score percentage was between 50% and 60%, fair when the mean score percentage was between 40% and 50%, below average when the mean score percentage was between 30% and 40%, poor when the mean score percentage was between 20 % and 30%, and as very poor when the mean score percentage was below 20%. Section 6.4.2 presents detailed analysis of students' performance of primary school first, followed by that of secondary and special schools.

### 6.4.1 An Overview

**Primary Schools**

Table 6.6 shows the mean score of each item in the primary schools. Students performed well in Q2 (Communicate), with the mean score percentage of 71.00% in the task 'fill in the email recipient correctly', followed by Q1.1 (Create), with the mean score percentage of 64.50% in the task 'create a table to categorize the information'. As for Q1.1 (Manage), students' performance in the task 'design an appropriate title for the table' was satisfactory with the mean score percentage of 54.50%. Students had the poorest performance in Q2 (Communicate), 'adopt an appropriate email format and style and clearly present the identity of the recipient and sender', with the mean scores percentage of 12.50%, followed by Q1.1 (Manage), 'arrange all the festivals chronologically starting from the Spring Festival', with the mean score percentage of 14.50%.

*Table 6.6 Primary school students' mean score of each Chinese Language PA item*

| Questions (IL Dimensions) | Full Score | Min | Max | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|
| Q1.1 (Access) | 10 | 0 | 10 | 2.65 | (3.00) | 26.50 |
| Q1.1 (Manage_file naming and saving) | 1 | 0 | 1 | 0.44 | (0.50) | 44.00 |
| Q1.1 (Manage_sequence) | 2 | 0 | 2 | 0.29 | (0.70) | 14.50 |
| Q1.1 (Manage_titles) | 2 | 0 | 2 | 1.09 | (0.99) | 54.50 |
| Q1.1 (Create) | 2 | 0 | 2 | 1.29 | (0.91) | 64.50 |
| Q1.2 (Define) | 3 | 0 | 3 | 1.39 | (0.95) | 46.33 |
| Q2 (Communicate_email address) | 1 | 0 | 1 | 0.71 | (0.45) | 71.00 |
| Q2 (Communicate_subject) | 2 | 0 | 2 | 0.98 | (0.64) | 49.00 |
| Q2 (Communicate_recipient & signature) | 2 | 0 | 2 | 0.25 | (0.50) | 12.50 |
| Q2 (Communicate_manner) | 2 | 0 | 2 | 0.45 | (0.79) | 22.50 |
| Q2 (Integrate) | 2 | 0 | 2 | 0.95 | (0.61) | 47.50 |
| Q3 (Evaluate) | 6 | 0 | 6 | 2.07 | (2.29) | 34.50 |
| Q4 (Access) | 4 | 0 | 4 | 1.72 | (1.67) | 43.00 |
| Q4 (Manage) | 1 | 0 | 1 | 0.39 | (0.49) | 39.00 |
| Q4 (Integrate_titles) | 2 | 0 | 2 | 0.77 | (0.87) | 38.50 |
| Q4 (Integrate_information filtering) | 3 | 0 | 3 | 0.86 | (1.03) | 28.67 |
| Q4 (Create) | 5 | 0 | 5 | 1.29 | (1.79) | 25.80 |

N=825
N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are weighted statistics.

### Secondary Schools

Table 6.7 shows the secondary school students' mean score of each item. Students had satisfactory performance in more than half of the items (with mean score percentages of over 50%). They had very good performance in Q1 (Create), 'create a table to categorize the information' and Q4 (Communicate), 'fill in the subject of the email explicitly'. The mean score percentages were 82.00% and 79.00% respectively. Other items with good performance included Q1 (Manage) 'produce an appropriate title for the table', Q1 (Manage) 'name the file as 「文學作品」 and save it in the 'My Documents' folder, Q4 (Communicate) 'fill in the email recipient correctly' and Q3.2 (Access) 'look for the meaning of the word using appropriate online dictionaries'. The mean score percentages for these items were all over 60.00%. Students had the poorest performance in Q4 (Communicate) 'communicate with teachers with appropriate register and standard written Chinese', the mean score percentage was 18.50%, followed by Q5 (Create) 'use special effects to create a PowerPoint file', Q5 (Integrate) 'integrate all the information collected to make PowerPoint slides, taking into consideration the literacy level and interests of the target readers (P3 students)', Q4 (Communicate) 'adopt an appropriate email format and style and clearly present the identity of recipient and sender' and Q4 (Integrate) 'include two main points in the email, i.e. "the morals of the story" and "request for teachers' comments"'.

The mean score percentages for these items were all less than 30%.

*Table 6.7 Secondary school students' mean score of each Chinese Language PA item*

| Questions (IL Dimensions) | Full Score | Min | Max | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|
| Q1 (Access) | 6 | 0 | 6 | 3.01 | (2.20) | 50.17 |
| Q1 (Manage_file naming and saving) | 1 | 0 | 1 | 0.63 | (0.48) | 63.00 |
| Q1 (Manage_titles) | 2 | 0 | 2 | 1.37 | (0.92) | 68.50 |
| Q1 (Manage_sequence) | 4 | 0 | 4 | 2.06 | (1.87) | 51.50 |
| Q1 (Create) | 2 | 0 | 2 | 1.64 | (0.73) | 82.00 |
| Q2 (Access) | 4 | 0 | 4 | 2.10 | (1.37) | 52.50 |
| Q3.1 (Evaluate) | 6 | 0 | 6 | 2.16 | (1.73) | 36.00 |
| Q3.2 (Access) | 2 | 0 | 2 | 1.21 | (0.89) | 60.50 |
| Q3.3 (Define) | 2 | 0 | 2 | 1.12 | (0.76) | 56.00 |
| Q4 (Communicate_email address) | 1 | 0 | 1 | 0.62 | (0.49) | 62.00 |
| Q4 (Communicate_subject) | 1 | 0 | 1 | 0.79 | (0.41) | 79.00 |
| Q4 (Communicate_recipient & signature) | 1 | 0 | 1 | 0.23 | (0.42) | 23.00 |
| Q4 (Communicate_manner) | 2 | 0 | 2 | 0.37 | (0.73) | 18.50 |
| Q4 (Integrate_content) | 2 | 0 | 2 | 0.81 | (0.69) | 40.50 |
| Q4 (Integrate_morals) | 2 | 0 | 2 | 0.51 | (0.66) | 25.50 |
| Q5 (Manage_file naming and saving) | 1 | 0 | 1 | 0.52 | (0.50) | 52.00 |
| Q5 (Manage_titles) | 1 | 0 | 1 | 0.52 | (0.50) | 52.00 |
| Q5 (Integrate_content) | 2 | 0 | 2 | 0.82 | (0.86) | 41.00 |
| Q5 (Integrate_information filtering) | 4 | 0 | 4 | 0.89 | (0.95) | 22.25 |
| Q5 (Create) | 4 | 0 | 4 | 0.87 | (1.12) | 21.75 |

N=820

N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are weighted statistics.

### Special Schools

Table 6.8 shows the special school students' mean score of each item. Students had poor or very poor performance in more than half of the items, with mean score percentage of less than 30%. They had good performance in Q4 (Communicate) 'fill in the subject of the email explicitly' and Q1 (Manage) 'produce an appropriate title for the table'. The mean score percentages were 63.00% and 62.50% respectively, followed by Q1 (Create) 'create a table to categorize the information' and Q4 (Communicate) 'fill in the email recipient correctly'. The mean score percentage were 58.50% and 50.00% respectively. Students had the poorest performance in Q4 (Communicate) 'communicate with teachers with appropriate register and standard written Chinese', with only a mean score percentage of 6.50%, followed by Q4 (Communicate) 'adopt an appropriate email format and style and clearly present the identity of the recipient and sender', Q5 (Integrate) 'integrate all the information collected to make PowerPoint slides, taking into consideration the literacy level and interests of the target readers (P3 students)', Q3.1 (Evaluate) 'define the meaning of the word 「釋」 within a particular sentence among all the different meanings of the word in the dictionary' and Q5 (Create) 'use special effects to create a PowerPoint'. Students performed very poorly in these tasks with mean score percentages below 10%.

*Table 6.8 Special school students' mean score of each Chinese Language PA item*

| Questions (IL Dimensions) | Full Score | Min | Max | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|
| Q1 (Access) | 6 | 0 | 6 | 1.75 | (2.13) | 29.17 |
| Q1 (Manage_file naming and saving) | 1 | 0 | 1 | 0.42 | (0.50) | 42.00 |
| Q1 (Manage_titles) | 2 | 0 | 2 | 1.25 | (0.99) | 62.50 |
| Q1 (Manage_sequence) | 4 | 0 | 4 | 1.29 | (1.68) | 32.25 |
| Q1 (Create) | 2 | 0 | 2 | 1.17 | (0.96) | 58.50 |
| Q2 (Access) | 4 | 0 | 4 | 1.67 | (1.63) | 41.75 |
| Q3.1 (Evaluate) | 6 | 0 | 6 | 0.54 | (1.41) | 9.00 |
| Q3.2 (Access) | 2 | 0 | 2 | 0.33 | (0.76) | 16.50 |
| Q3.3 (Define) | 2 | 0 | 2 | 0.71 | (0.86) | 35.50 |
| Q4 (Communicate_email address) | 1 | 0 | 1 | 0.50 | (0.51) | 50.00 |
| Q4 (Communicate_subject) | 1 | 0 | 1 | 0.63 | (0.49) | 63.00 |
| Q4 (Communicate_recipient & signature) | 1 | 0 | 1 | 0.08 | (0.28) | 8.00 |
| Q4 (Communicate_manner) | 2 | 0 | 2 | 0.13 | (0.45) | 6.50 |
| Q4 (Integrate_content) | 2 | 0 | 1 | 0.46 | (0.51) | 23.00 |
| Q4 (Integrate_morals) | 2 | 0 | 2 | 0.42 | (0.78) | 21.00 |
| Q5 (Manage_file naming and saving) | 1 | 0 | 1 | 0.29 | (0.46) | 29.00 |
| Q5 (Manage_titles) | 1 | 0 | 1 | 0.21 | (0.41) | 21.00 |
| Q5 (Integrate_content) | 2 | 0 | 1 | 0.33 | (0.48) | 16.50 |
| Q5 (Integrate_information filtering) | 4 | 0 | 1 | 0.33 | (0.48) | 8.25 |
| Q5 (Create) | 4 | 0 | 2 | 0.38 | (0.71) | 9.50 |

N=24

N.B. - N listed in the table is the unweighted number of students
- "Mean Score", "SD" and "Mean Score Percentage (%)" are unweighted statistics.

### 6.4.2 Students' Responses for Each Item

#### *6.4.2.1 Primary Schools*

***Question 1***

Q1 included 2 sub-questions. Q1.1 required P5 students to use information found from the Internet and appropriate software to create a table matching the festivals with their respective customs and arrange these festivals in chronological order. The IL dimensions assessed in this question included "access", "manage" and "create". Q1.2 assessed students' competence in the "define" dimension; students were required to use appropriate keywords to search for information.

Question 1.1

Q1.1 required P5 students to use information found from the Internet and appropriate software to create a table matching the festivals with their respective customs and arrange these festivals in chronological order. It was observed that 24.61% of the students did not answer this question and got 0 marks, probably because of insufficient time. The IL dimensions assessed in this question included "access" (10 marks), "manage" (5 marks) and "create" (2 marks). Tables 6.9 to 13 present students' performance in Q1.1.

In general, students' performance in the "access" dimension was poor (see Table 6.9). The mean score was 2.65 out of 10 and the mean score percentage was 26.50%. 2.19% of the students got full marks and had reached the "advanced" level; 21.57% of the students got 6 to 8 marks and reached the "proficient" level; 31.53% got 2 to 4 marks and reached the "basic" level; 20.09% responded to this question but were not able to score, showing that students had not master this IL competence.

Students had the best performance in the matching of 'Dragon Boat Festival' and 'Chung Yeung Festival' with its respective customs; but students had the worst performance in matching 「守歲」 with the 'Spring Festival'. A number of students lost marks in this question because they could not match these items successfully. In addition, some students did not read the instructions carefully. Instead of matching the festivals with their corresponding customs, they created their own festivals and customs and thus got 0 marks in this part (e.g. Student 112016 wrote「元宵」for festival and 「觀燈」 for the custom).

*Table 6.9 Percentage distributions of P5 students for each score of Q1.1 (Access) in Chinese Language PA*

| Score (%) | | | | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **2.00** | **4.00** | **6.00** | **8.00** | **10.00** | | | | |
| 20.09 | 24.61 | 17.15 | 14.38 | 10.72 | 10.85 | 2.19 | 100 | 2.65 | (3.00) | 26.50 |

N=825

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 112016)

- This student creates his own festivals and ways of observations (Access: 0 marks)

| 節日 | 習俗 |
|---|---|
| 元宵 | 觀燈 |
| 清明 | 拜祖先 |
| 中秋 | 吃月食月餅 |

Among the 3 subtasks of “manage” in this question, students performed the best in ‘designing an appropriate title for the table’, with mean score percentage of 54.50%, followed by the subtask ‘name the file as「節日習俗」and save it in the ‘My Documents’ folder’, with mean score percentage of 44.00%. The students performed the poorest in the subtask ‘arrange all the festivals chronologically’, with mean score percentage of 14.50%.

For the subtask, ‘able to design an appropriate title for the table’, students’ performance was satisfactory (see Table 6.10). 54.16% of the students were able to use titles to separate the information collected. But some students only had either「節日」(Festivals) or「習俗」(Customs) as their table title instead of having both and only scored 1 mark (see Student: 114003 as an example). In addition, 20.68% of the students failed to design an appropriate title for their tables (see Student: 108020 as an example).

*Table 6.10 Percentage distributions of P5 students for each score of Q1.1 (Manage_titles) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | | | | |
| 20.68 | 24.61 | 0.55 | 54.16 | 100 | 1.09 | (0.99) | 54.50 |

N=825

N.B. - N listed in the table is the unweighted number of students.
- “Score (%)”, “Mean Score” and “SD” are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 114003)

- Lack one title (Manage: 1 mark)

| 節日 | |
|---|---|
| 1. 春節 | 掃塵，守歲 |
| 2. 端午 | 掛菖蒲 |
| 3. 冬至 | 添歲 |
| 4. 重陽 | 插茱萸 |

(Student: 108020)

- Fail to use any title to separate materials. (Manage: 0 marks)

| | |
|---|---|
| 端午節 | 划龍舟 |
| 春節 | 大掃除 |
| 冬至 | 吃湯圓 |
| 重陽 | 吃花糕 |

For the task 'name the file as 「節日習俗」 and save it in the 'My Documents' folder, students' performance was fair (see Table 6.11). The mean score was 0.44 out of 1 and mean score percentage was 44.00%. 44.12% of the students were able to name the file correctly and save it accordingly; 31.27% of the students did not name the file correctly and scored 0 marks, in which quite a number of students created a file name by themselves. For instance, Student 120016 named the file as 「節日」(festivals) instead of「節日習俗」(Festivals and Customs), which was given in the instruction. However, all students were able to save the file in the correct folder given in the instruction; no student saved the file in folders other than the 'My Documents' folder.

*Table 6.11 Percentage distributions of P5 students for each score of Q1.1 (Manage_ file naming and saving) in Chinese Language PA*

| Score (%) | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | | | | |
| 31.27 | 24.61 | 44.12 | 100 | 0.44 | (0.50) | 44.00 |

N=825

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

In general, students performed very poorly in the task 'arrange all the festivals chronologically starting with the Spring Festival' in Q1.1 (see Table 6.12). The mean score was 0.29 out of 2 and the mean score percentage was 14.50%. Only 14.10% of the students were able to arrange the festivals correctly and got full marks. 60.94% of the students completed this task but scored 0 marks because they did not arrange the festivals according to the instruction (see Student: 117003 as an example).

*Table 6.12 Percentage distributions of P5 students for each score of Q1.1 (Manage_sequence) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | | | | |
| 60.94 | 24.61 | 0.35 | 14.10 | 100 | 0.29 | (0.70) | 14.50 |

N=825
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 117003)

- Fail to arrange the festivals chronologically starting from the Spring Festival as the instruction states. (Manage: 0 marks)

| 節日 | 習俗 |
|---|---|
| 冬至 | 添歲 |
| 端午 | 掛菖蒲 |
| 春節 | 掃塵 |
| 重陽 | 插茱萸 |

Students' performance in Q1.1 (Create) was good (see Table 6.13). The mean score was 1.29 out of 2 and mean score percentage was 64.50%. They were required 'to create a table to categorize the different customs and festivals'. 60.11% of the students got full marks; they were all able to adopt appropriate software to create a table and then categorize the information into two columns with appropriate headings (i.e.「節日」and「習俗」). Some students used EXCEL for this task, since EXCEL generates tables automatically, so as long as the students had categorized information correctly, full marks were awarded. However, 8.67% of the students only scored 1 mark as their tables did not show any gridlines (see Student: 104005 as an example). Only 6.60% of the students attempted this task but scored 0 marks either because they failed to create a table or they did not categorize the information (see Student: 124037 as an example).

*Table 6.13 Percentage distributions of P5 students for each score of Q1.1 (Create) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | | | | |
| 6.60 | 24.61 | 8.67 | 60.11 | 100 | 1.29 | (0.91) | 64.50 |

N=825
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 104005)

- Able to create a table but fail to provide the table with gridlines (Create: 1 score)

| 中國傳統節日： | 習俗： |
|---|---|
| ii. 端午 | ii. 掛菖蒲 |
| iii. 春節 | iii. 插茱萸 |
| iv. 重陽 | iv. 添歲 |

(Student: 124037)

- Unable to create a table to categorize the information (Create: 0 score).

春節 ← → 掃塵
重陽 插茱萸
端午 添歲
冬至 ← → 掛菖蒲

Question 1.2

Q1.2 assessed students on their competences in the "define" dimension. Students were required to identify appropriate keywords to search for information. The majority of the students (98.95%) attempted this task (see Appendix 6.1). Students' overall performance was fair. The mean score was 1.39 out of 3 and mean score percentage was 46.33% (see Table 6.14). There were only 10.44% of the students who got full marks. 40.72% of the students got 2 marks, mainly because the keywords they used were too general, for example, the key words did not include either「中國」(China),「節日」(festivals) or「習俗」(Customs). Student 143008, for instance, used「節日習俗」as a keyword. 26.33% of the students got 1 mark, mainly because the keywords used were too specific, i.e. specific festivals or a particular custom were used as keywords. Student 120018, for instance, used 'Spring Festival' as a keyword. 21.45% of the students had answered this question but got 0 marks. Most of them did not understand the instructions or gave nonsense answers, e.g. filling in the web address of a search engine or putting some meaningless words or numbers. Student 123004, for instance, put in「雅虎香港」and Student 135001 put in '123'.

*Table 6.14 Percentage distributions of P5 students for each score of Q1.2 (Define) in Chinese Language PA*

| **Score (%)** | | | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | **3.00** | | | | |
| 21.45 | 1.05 | 26.33 | 40.72 | 10.44 | 100 | 1.39 | (0.95) | 46.33 |

N=825

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

***Question 2***

This question required the students to write an email to a teacher, reporting the meaning of the phrase ‘茱萸’, the radicals of the two Chinese words and their homonyms, requesting teachers’ comments upon the accuracy of this information. 95.16% to 96.60% of the students responded to this question (see Appendix 6.1). This question assessed students on their competences in “communicate” (7 marks) and “integrate” (2 marks) dimensions.

Students’ overall performance in the “communicate” dimension was below average. The mean score was 2.39 out of 7 and the mean score percentage was 34.14%. Among the 4 subtasks of “communicate”, students performed better in ‘fill in the correct email recipient’, with mean score percentage of 71.00%; followed by ‘fill in an explicit subject for the email’, with mean score percentage of 49.00%. The students performed less well in the other two subtasks, i.e. ‘communicate with teachers using an appropriate register and standard written Chinese’ and ‘adopt an appropriate email format and style and clearly present the identity of the recipient and sender’; the mean score percentages were 22.50% and 12.50% respectively.

In the subtask ‘fill in the correct email recipient’, students’ overall performance was very good (see Table 6.15). The mean score was 0.71 out of 1 and the mean score percentage was 71.00%. 71.19% of the students got full marks as they were able to fill in the correct email recipient as given in the instruction i.e. teacher@myschool.net.  Most students who failed this task fill in the title of the recipient, ‘teacher’ instead. This might indicate that these students were not familiar with the email formats (see Student: 132005 as an example). In addition, a few students failed to score because of the typos in the email address, e.g. Student 125024 typed “teacher@myschoo.net”.

*Table 6.15  Percentage distributions of P5 students for each score of Q2 (Communicate_email address) in Chinese Language PA*

| **Score (%)** | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | | | | |
| 25.42 | 3.40 | 71.19 | 100 | 0.71 | (0.45) | 71.00 |

N=825
N.B. - N listed in the table is the unweighted number of students.
- “Score (%)”, “Mean Score” and “SD” are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

In the subtask ‘fill in an explicit subject for the email’, students’ performance was fair (see Table 6.16). The mean score was 0.98 out of 2 and the mean score percentage was 49.00%. 19.83% of the students got full marks; they were able to fill in the subject of the email accurately and explicitly. 58.62% of the students got 1 mark, most of them used「茱萸」as the subject, which was rather vague, general and unable to tell the reader the purpose or the content of the email (see Student: 126011 as an example). 16.71% of the students had answered this question but scored 0 marks. Some of these students put in the recipient's email address as the subject, while putting the recipient's title 'Teacher' as the email address. This again might suggest that these students were not familiar with the email format (see Student: 132020 as an example). A few students provided nonsense answers with some irrelevant words. For instance, Student 136013 demonstrated wrote 'abc' as the email subject.

*Table 6.16 Percentage distributions of P5 students for each score of Q2 (Communicate_subject) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | | | | |
| 16.71 | 4.84 | 58.62 | 19.83 | 100 | 0.98 | (0.64) | 49.00 |

N=825
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

Students' performance in 'communicating with teachers using appropriate register and standard written Chinese' was poor (see Table 6.17). The mean score was 0.45 out of 2 and mean score percentage was 22.50%. 18.65% of the students got full marks. They were able to communicate with teachers using an appropriate register and talk to the teacher politely (see Student: 137018 as an example). A few students (7.45%) scored 1 mark; these students included a communication component in their emails, however, marks were deducted because their expressions sounded like talking with peers and lacked the courtesy when communicating with teachers (see Student: 139004 as an example). 69.38% of the students had answered this subtask but scored 0 marks. Most of them ignored the communication requirement of the task. They wrote the information about「茱萸」throughout the email with no communication at all with the recipient, nor did they enquire the teacher about the accuracy of the information (see Student: 139011 as an example).

*Table 6.17 Percentage distributions of P5 students for each score of Q2 (Communicate_manner) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | | | | |
| 69.38 | 4.53 | 7.45 | 18.65 | 100 | 0.45 | (0.79) | 22.50 |

N=825
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

Student performed very poorly in 'adopting an appropriate email format and style and clearly present the identity of recipient and sender' (see Table 6.18). The mean score was 0.25 out of 2 and mean score percentage was 12.50%. Only 3.06% of the students were able to get full marks (see Student: 137018 as an example). 18.73% of the students got 1 mark. Most of these students mentioned the recipient, i.e. teacher, but failed to mention who the sender was (see Student: 137006 as an example). 73.69% of the students had answered this question but got 0 marks in this task because they were unable to indicate the identity of the email recipient and the sender, showing rather weak awareness of the relationship between the two parties (see Student: 139011 as an example).

*Table 6.18 Percentage distributions of P5 students for each score of Q2 (Communicate_recipient & signature) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | | | | |
| 73.69 | 4.53 | 18.73 | 3.06 | 100 | 0.25 | (0.50) | 12.50 |

N=825
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 137018)

- Clearly present the identity of the recipient and the sender (Communicate _recipient & signature: 2 marks)
- Communicate with teachers using appropriate register and standard written Chinese (Communicate_manner: 2 marks)
- Able to select and integrate the information in the email (Integrate: 2 marks)

親愛的老師:

茱萸」的詞義:是吳茱萸、食茱萸、山茱萸三種植物的統稱。
部首:是「艸」。「艸」是草本植物的總稱。
同音字:而「萸」的粵音為「jyu4」，有「如」、「愚」、「餘」等同音字。
現在我想請教老師這些資料是否正確

學生
喬家穎上

(Student: 139011)

- Fail to indicate who the identity of the recipient and sender in email (Communicate_recipient & signature: 0 marks)
- Utterly lack communication component (Communicate_manner: 0 marks)

| |
|---|
| 茱萸，是吳茱萸、食茱萸、山茱萸三種植物的統稱。農曆九月九日重陽節時，秋高氣爽，正是茱萸成熟之時。古人認爲茱萸是治病驅邪之物，所以他們會於重陽節頭插茱萸，登高遊興，唐代詩人王維於《九月九日憶山東兄弟》說：「遙知兄弟登高處，遍插茱萸少一人。」可見重陽節插茱萸是很普遍的風俗。　茱萸二字的部首同是「艸」。「艸」是草本植物的總稱。同「草」。「茱」是形聲字，「艸」是形旁，「朱」是聲旁，粵音爲「zyu1」，同音字有「珠」、「豬」、「諸」等。而「萸」的粵音爲「jyu4」，有「如」、「愚」、「餘」等同音字。 |

(Student: 137006)

- Indicated who the target recipient was (teachers), but failed to mention who the sender was (Communicate_recipient & signature: 1 mark)

| |
|---|
| 老師:<br>我在網上找到一些關於茱萸,想向你請教是否正確. |

(Student: 139004)

- Adopting expressions suitable for communication between peers, rather than the student-teacher relationship, therefore the email lacks appropriateness (Communicate_manner: 1 mark)

| |
|---|
| 茱萸》　茱萸，是吳茱萸、食茱萸、山茱萸三種植物的統稱。農曆九月九日重陽節時，秋高氣爽，正是茱萸成熟之時。古人認爲茱萸是治病驅邪之物，所以他們會於重陽節頭插茱萸，登高遊興，唐代詩人王維於《九月九日憶山東兄弟》說：「遙知兄弟登高處，遍插茱萸少一人。」可見重陽節插茱萸是很普遍的風俗。　茱萸二字的部首同是「艸」。「艸」是草本植物的總稱。同「草」。「茱」是形聲字，「艸」是形旁，「朱」是聲旁，粵音爲「zyu1」，同音字有「珠」、「豬」、「諸」等。而「萸」的粵音爲「jyu4」，有「如」、「愚」、「餘」等同音字。　是否正確 0? |

Students' performance in the "integrate" dimension was fair in which they were required to 'integrate main points of the information collected and express them clearly' (see Table 6.19). The mean score was 0.95 out of 2 and mean score percentage was 47.50%. 16.29% of the students got full marks (see Student: 137018 as an example). 62.41% of the students got 1 mark only. Most of these students did not organize the information but simply cut and pasted the information from the original source along with irrelevant information (see Student: 139004 as an example). Some students did organize the information collected, but the answer was either incomplete or partly wrong (see Student: 105016 as an example). 16.77% of the students had answered this question but got 0 marks as most of these students misunderstood the question instruction and failed to include the required information; some students included entirely irrelevant information (see Student: 107006 as an example). It is worthwhile to mention that although necessary information was provided in the instruction, some students preferred to use search engines to collect information on their own and then used the information they found to write the email (see Student: 116009 as an example).

*Table 6.19 Percentage distributions of P5 students for each score of Q2 (Integrate) in Chinese Language PA*

| **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | | | | |
| 16.77 | 4.53 | 62.41 | 16.29 | 100 | 0.95 | (0.61) | 47.50 |

N=825

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 105016)

Comments: Demonstrating information organization and integration, but the content is incomplete (lack the word meaning). One mark was deducted. (Integrate: 1 mark)

茱萸二字的部首同是「艸」。「艸」是草本植物的總稱。同「草」。「茱」是形聲字，「艸」是形旁，「朱」是聲旁，粵音爲「zyu1」，同音字有「珠」、「豬」、「諸」等。而「萸」的粵音爲「jyu4」，有「如」、「愚」、「餘」等同音字。是茱萸成熟之時。

(Student: 107006)

Comments: Misunderstood the question and, failed to mention the required content completely, therefore, no mark was given to the "integrate" dimension in this question (Integrate: 0 marks)

請教老師這些資料是否正確。

(Student: 116009)

Comment: This student used search engines to search for information on「茱萸」and write the email based on the information collected on his own. (Integrate: 0 marks)

九月九日律中無射而數九，俗於此日以茱萸氣烈成熟，尙此日折茱萸房以插頭，言辟惡氣而禦初寒。

### *Question 3*

Q3 required students to make a comparison between the information collected and the passage provided; hence, identify and correct the erroneous parts in the passage. Successful completion of this task required effective evaluation of digital information collected. This question assesses students on their competences in the "evaluate" dimension. 84.94% of the students responded to this question (see Appendix 6.1). Students' overall performance of Q3 was below average, with mean score of 2.07 out of 6 and the mean score percentage of 34.50%. Table 6.20 presents students performance in Q3.

19.89% of the students scored between 5 to 6 marks (see Student: 138021 as an example). 28.22% of the students scored between 2 to 4 marks. Most students of the latter group were able to identify the three mistakes in the passage but were unable to correct them (see Student: 117019 as an example). 51.89% of the students scored between 0 and 1 mark. Most students of this group misinterpreted the task and made corrections on the typos and/or meaning of the Chinese words; consequently they altered some words used in the passage to other words with similar meaning, e.g. from 「變遷」 to 「變化」、from 「插茱萸」 to 「佩茱萸」、 from 「多采多姿」to「多姿多采」、from「粽子」to「種子」(see Student: 114008 as an example). Some students provided nonsense answers in this question, with some irrelevant English letters or numbers. (see Student: 115007 as an example). 15.06% of the students did not respond to this question and left it blank, probably because of the lack of time.

*Table 6.20 Percentage distributions of P5 students for each score of Q3 (Evaluate) in Chinese Language PA*

| **Score (%)** | | | **Total** | **Mean** | **(SD)** | **Mean Score** |
|---|---|---|---|---|---|---|
| **0-1** | **2-4** | **5-6** | **(%)** | **Score** | | **Percentage (%)** |
| 51.89 | 28.22 | 19.89 | 100 | 2.07 | (2.29) | 34.50 |

N=825
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 138021)

- Able to identify the three mistakes and make corrections accordingly (Evaluate: 6 marks)

請修正文中錯誤的地方：
一、吃粽子　應改爲 吃重陽糕（菊糕）
二、賞月　應改爲　賞菊
三、龍舟競渡　應改爲　射箭

(Student: 117019)

- Able to identify the three mistakes, but fail to make corrections accordingly (Evaluate: 3 marks)

請修正文中錯誤的地方：
一、賞月　應改爲 ________
二、吃粽子　應改爲 ________
三、龍舟競渡　應改爲 ________

(Student: 114008)

- Misunderstood the task, taking it as correction of typos or word meanings (Evaluate: 0 marks)

| |
|---|
| 請修正文中錯誤的地方： |
| 一、易　應改爲 ＿已＿ |
| 二、多采多姿　應改爲 ＿多姿多采＿ |
| 三、飲　應改爲 ＿喝＿ |

(Student: 115007)

- nonsense answers, filling in irrelevant English letters or numbers (Evaluate: 0 marks)

| |
|---|
| 請修正文中錯誤的地方： |
| 一、歷史　應改爲 ＿ABC＿ |
| 二、豐富　應改爲 ＿DEF＿ |
| 三、節日　應改爲 ＿12345678910＿ |

***Question 4***

Q4 required students to use search engines or other online instruments to collect texts or pictures about the Chung Yeung Festival and then use the materials collected to create PowerPoint slides, introducing the Chung Yeung festival to P3 students. It was observed that 35.22% of the students did not answer this question and got 0 marks probably because of the short of time (see Appendix 6.1). Q4 assessed students on their IL competence in “access” (4 marks), “manage” (1 mark), “integrate” (5 marks) and “create” (5 marks).

In the “access” dimension of Q4, students’ performance was fair (see Table 6.21). The mean score was 1.72 out of 4 and mean score percentage was 43.00%. 18.63% of the students got full marks (see Student: 114002 as an example). 28.72% of the students included the three aspects of the Chung Yeung festival: its origin, customs and festive food and got 3 marks. Some failed to include the sources of reference and were not awarded full marks. 10.26% of the students had answered Q4 but got 0 marks as they failed to complete the content of the PowerPoint file, probably because of the lack of time.

*Table 6.21 Percentage distributions of P5 students for each score of Q4 (Access) in Chinese Language PA*

| **Score (%)** | | | | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | **3.00** | **4.00** | | | | |
| 10.26 | 35.22 | 3.41 | 3.77 | 28.72 | 18.63 | 100% | 1.72 | (1.67) | 43.00 |

N=825
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

Students' performance in the "manage" dimension was below average (see Table 6.22). The mean score was 0.39 out of 1 and mean score percentage was 39.00%. This question required students to 'name the file as「重陽節」and save it in the 'My Documents' folder. 38.93% of the students were able to name the file correctly and save it in the folder required and got full marks, e.g. Student 114002 saved the file as 「重陽節.ppt」 in the 'My Documents' folder. 25.85% of the students completed this task but failed to score. These students named the file wrongly, e.g. Student 120016 named the PowerPoint as 'J'. All students who attempted the questions were able to save the file in the correct folder. There were not any students who saved the file elsewhere outside of the 'My Documents' folder.

*Table 6.22 Percentage distributions of P5 students for each score of Q4 (Manage) in Chinese Language PA*

| **Score (%)** | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | | | | |
| 25.85 | 35.22 | 38.93 | 100 | 0.39 | (0.49) | 39.00 |

N=825
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

Students' overall performance in the 5-mark "integrate" dimension ranged from below average to poor. Comparing students' performance in the two subtasks, students performed better in 'using titles to categorize the information collected', with mean score percentage of 38.50%; followed by 'integrate all the information collected to make PowerPoint slides, taking into consideration the literacy level and interests of the target readers (P3 students)', with mean score percentage of 28.67%.

Students' performance in the subtask, 'use titles to categorize information, to allocate similar information under the same title or within the same page', was below average (see Table 6.23). The mean score was 0.77 out of 2 and mean score percentage was 38.50%. 28.72% of the students were able to use titles to categorize information and got full marks (see Student: 114002 as an example). 19.47% of the students got 1 mark, among whom most students only use one single title 「重陽節」 instead of using different titles to clearly categorize the information or separating them into different pages (see Student: 106012 as an example). 16.59% of the students completed this task but got 0 marks. These students were able to collect information from the Internet, but failed to use titles or page breaks to categorize the information collected (see Student: 116021 as an example).

*Table 6.23 Percentage distributions of P5 students for each score of Q4 (Integrate_titles) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | | | | |
| 16.59 | 35.22 | 19.47 | 28.72 | 100 | 0.77 | (0.87) | 38.50 |

N=825
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

Students' overall performance in the subtask, 'integrate all the information collected to make PowerPoint slides, taking into consideration the literacy level and interests of the target readers (P3 students)', was poor (see Table 6.24). The mean score was 0.86 out of 3 and mean score percentage was 28.67%. Only 8.31% of the students got full marks. They were able to select and integrate the information and materials collected from the Internet and create PowerPoint slides with precise and concise content to suit the target readers (see Student: 114002 as an example). 22.48% of the students scored 2 marks in this task. They were able to use the information collected to create PowerPoint slides, but the information included was not well selected and organized, e.g. pieces of information was found directly copied from the originals, the content was too long, fonts size were too small and above all it was inappropriate for the P3 students (see Student: 120007 as an example). 15.95% of the students got 1 mark in this task; they only cut a large piece of information from the Internet and pasted it in the PowerPoint slides, paying no attention to the layout of the content (see Student: 116021 as an example). 18.04% of the students had created the PowerPoint file but still got 0 marks in this task, which might be resulted from insufficient time left, or due to the fact that this question appeared at the end of the assessment. Some of them only put a single title「重陽節」on the PowerPoint slide without any content and thus scored 0 marks (see Student: 105013 as an example).

*Table 6.24 Percentage distributions of P5 students for each score of Q4 (Integrate_information filtering) in Chinese Language PA*

| **Score (%)** | | | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | **3.00** | | | | |
| 18.04 | 35.22 | 15.95 | 22.48 | 8.31 | 100 | 0.86 | (1.03) | 28.67 |

N=825
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

Students' overall performance in the 5-mark "create" dimension in Q4, which required students to 'use special effects in the creation of a PowerPoint', was poor (see Table 6.25). The mean score was 1.29 out of 5 and mean score percentage was 25.80%. Only 7.57% of the students got full marks. These students were able to use three or more special effects in their PowerPoint file, e.g. font styles, colours, background, audio effects, pictures, animations and slide transitions. Therefore, they were rated as having reached the "advanced" level of "create" dimension (see Student: 119004 as an example). 14.35% of the students scored 4 marks in this task; they were able to use two special effects in their PowerPoint file and had reached the "proficient" level of the "create" dimension. However, these students' works were found rather simple and straightforward, with special effects like bolded or italicized fonts. In addition, in cases where colour effects were adopted, it was likely because of the direct copying from the Internet, rather than students' deliberate use of colors. In general, only a few students were able to create a simple yet exquisite PowerPoint file. 16.69% of the students got 2 marks; they used only one special effect in their PowerPoint file and had reached the "basic" level of the "create" dimension (see Student: 12007 as an example). It was worthwhile to mention that although 26.18% of the students completed this task, they scored 0 marks. The PowerPoint files they created did not have any special effects, but only plain text (see Student: 116021 as an example). Some students' PowerPoint files were not completed, probably because of the lack of time, thus got 0 marks in this "create" dimension (see Student: 105013 as an example).

*Table 6.25 Percentage distributions of P5 students for each score of Q4 (Create) in Chinese Language PA*

| **Score (%)** | | | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **2.00** | **4.00** | **5.00** | | | | |
| 26.18 | 35.22 | 16.69 | 14.35 | 7.57 | 100.01 | 1.29 | (1.79) | 25.80 |

N=825
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 114002)

- This PowerPoint file included the origin, customs and festive food for the Chung Yeung festival, along with references. (Access: 4 marks)
- Able to categorize the information with titles (Integrate_titles: 2 marks)
- Able to select and organize the information collected, to create PowerPoint slides with precise and concise content, appropriate for the target readers (P3 students) (Integrate_information sorting: 3 marks)
- Able to use two special effects in the PowerPoint, i.e. colours and pictures. (Create: 4 marks)

## 重陽節的起源

- 詩人屈原在《遠遊》中有"集重陽入帝宮兮"之描述，我們可知遠於戰國時代已有"重陽"的稱謂。。歷經魏晉南北朝，重陽節成爲一個很受重視的節日，至唐更被皇室確立爲正式的節日。

## 重陽節的習俗

- 根據文獻記載，西漢初年的宮廷已有過重陽的風尙——相傳劉邦死後，宮中侍女賈佩蘭被逐出宮外，下嫁扶風平民段儒爲妻，曾對別人講過宮中每年九月初九，都有飲菊花酒、吃蓬餌（即重陽糕）和帶茱萸等祈求長壽的習俗。

## 重陽節的應節食品

- 有:飲 菊 花 酒 ,重陽糕

## 參考網址/網上工具/資料來源

- http://www.chiculture.net/1302/html/1302festivals_b04b.shtml, 雅虎香港

(Student: 106012)

- Only put one single title 「重陽節」 instead of using different titles to clearly categorize the information or separating them into different pages. (Integrate_titles: 1 mark)

重陽節

以九爲陽數，日月皆逢九，故叫重陽。傳說此日人有災難，帶茱萸囊登山飲菊花酒可免禍。

(Student: 116021)

- Failed to use titles or separate pages to categorize the information collected. (Integrate_titles: 0 marks)
- This student only cut a large piece of information from the source and pasted it directly without necessary further editing, like changing the font size, or summarizing. (Integrate_information filtering: 1 mark)
- The PowerPoint file did not show any special effects like colors or background, only plain text was provided. (Create: 0 marks)

九九重陽，因爲與"久久"同音，九在數字中又是最大數，有長久長壽的含意，況且秋季也是一年收穫的黃金季節，重陽佳節，寓意深遠，人們對此節歷來有著特殊的感情，唐詩宋詞中有不少賀重陽，咏菊花的詩詞佳作。

今天的重陽節，被賦予了新的含義，在1989年，我國把每年的九月九日定爲老人節，傳統與現代巧妙地結合，成爲尊老、敬

(Student: 12007)

- Able to use the information to create a PowerPoint, but lacked selection and organization of the information (e.g. the passage is rather too long, the font size too small), also there were occasional use of the original texts without necessary adaptation. Overall, it was not very appropriate for the target readers (P3 students). (Integrate _ information filtering: 2 marks)
- Only used one special effect i.e. bolded font in the PowerPoint file. (Create: 2 marks)

**重陽節的起源**

- 重陽節秋高氣爽，亦是登高遠足的好日子。據說此習俗起源可追溯至漢代（公元前206—公元220），當時有一位相士對桓景說，在農曆的九月九日，他必須攜同家眷到鄉郊的最高處暫避災禍。桓景言聽計從，舉家登山避難，結果在回家的途中，他發現整條鄉村經歷了一場浩劫，家禽家畜無一倖免。自此，人們效法登高之舉，成爲習俗。

重陽節的習俗

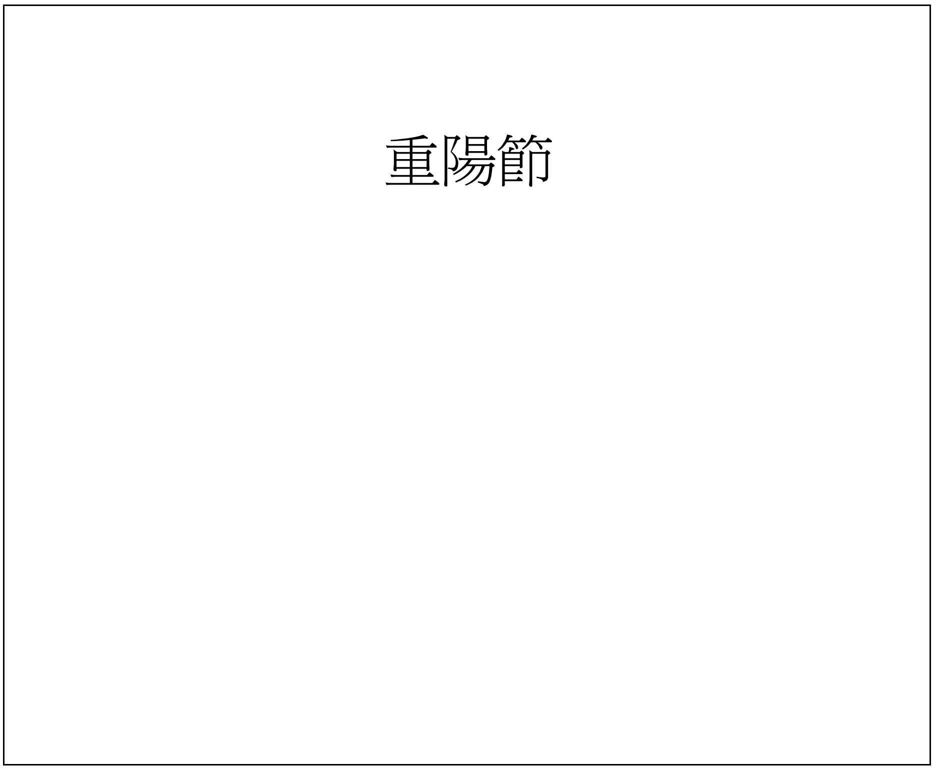
- **重陽賞菊**
  中國是世界上最早栽種菊花的國家。欣賞菊花是中國人過重陽節的一大樂事。中國晉朝大詩人陶淵明的詠菊名句"采菊東籬下，悠然見南山"，"芳菊開林耀，青松冠岩列"，傳誦千古。宋朝學者孟元老在《東京夢華錄》中，列舉了"九月重陽"賞菊的諸種芳名，如黃白色的"萬齡菊"、粉紅色的"桃花菊"、白而檀心的"木香菊"、黃色而圓的"金鈴菊"、純白而大的"喜容菊"等等。宋朝開封由於菊花品種的繁多，甚至連旅店都用菊花雜起了一座座"花門"；明清之後，中國各地在重陽節前後都要舉行盛大的菊花大會，"萬菊競豔，菊龍欲飛"，人們傾城出動，以至出現萬人空巷的盛況。
- **重陽遊樂**
  重陽節也是古代中國人開展騎射活動的大好時機。南北朝時，朝廷規定，每年重陽，人們必須騎馬射箭，並將它列入武舉應試科目。唐朝，朝廷允許五品以上官員在重陽時齊集於玄武門，練習騎射。至於民間喜好的放風箏活動，更呈現了放去災邪、除去晦氣的心理寄託。

  在江南等地還有在重陽節懸五色旗的習俗，旗紙爲宣紙或連史紙，形狀有正方形、三角形、長方形不等，旗的邊緣鑲有紙質流蘇，旗上所繪內容多爲古代傳說故事，如"八仙過海"、"三國故事"、"精忠嶽傳"、或"二十四孝"等，大街小巷一片旗海，令人眼花繚亂，目不暇給。參

  觀者人數眾多，像元宵觀燈一樣熱鬧 。

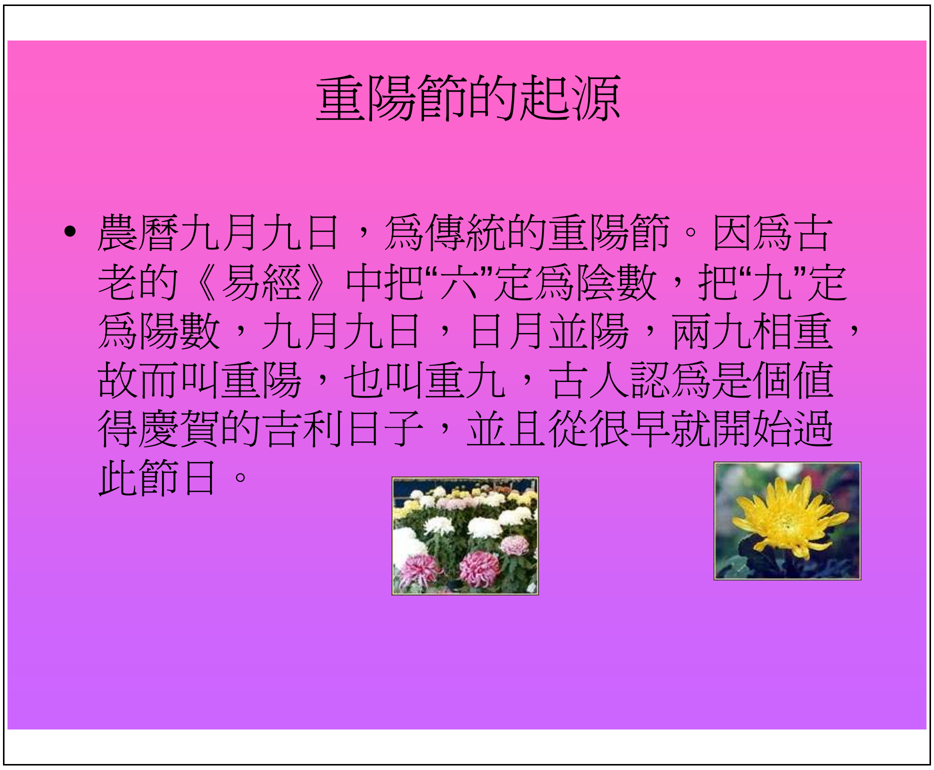
(Student: 105013)

- The PowerPoint had only one single title '重陽節' but had not finished with filling in the supporting content. (Integrate _information filtering: 0 marks)
- Incomplete task, possibly because of the insufficient time left or other reasons (Create: 0 marks)

(Student: 119004)

- Able to use three or more special effects in creating a PowerPoint, in this case, the student used background, pictures and colors. (Create: 5 marks)

# 重陽節的習俗

- 慶祝重陽節的活動多彩浪漫，一般包括出遊賞景、登高遠眺、觀賞菊花、遍插茱萸、吃重陽糕、飲菊花酒等活動。

# 重陽節的應節食品

- **重陽食蟹和羊肉**
  糕點畢竟只是點心，過佳節總得吃些美味佳餚。重陽節期間正值是中國江南沿海蟹肥魚美之時，吃蟹便成爲當地過節的一大樂事；與此同時，秋天正是羊兒肥壯的時節，羊肉性暖，能卻寒，重陽節吃羊肉很自然地成爲中國江北和塞外的習俗，再說"羊"和"陽"正好同音，重陽吃"羊"，也是非常有趣的事情。

- 蟹是中國江南沿海重陽節重要的菜餚之一


### *6.4.2.2 Secondary Schools and Special Schools*

The participants of the Secondary Chinese Language PA included students from both the secondary and special schools. The following section presents students' performance in secondary schools first, followed by special schools.

***Question 1***

Q1 required students to use the information found from the Internet and appropriate software to create a table and match the different literature works with their corresponding dynasties. This question assessed students on the IL dimensions of "access" (6 marks), "manage" (7 marks) and "create" (2 marks).

**<u>Secondary Schools</u>**

89.48% of the students responded to Q1 (see Appendix 6.2). Students' performance in "access" was satisfactory (see Table 6.26). The mean score was 3.01 out of 6 and mean score percentage was 50.17%. 34.32% of the students scored between 5 to 6 marks and reached the "advanced" level of "access" (see Student 233005 as an example). The most common error that students made was mixing up literature works of the Yuan Dynasty with those of the Sui Tang Dynasty, for instance, Student 232007 matched「西廂記」written by Wang Shi-fu of Yuan Dynasty with Sui Tang Dynasty. In addition, 10.94% of the students completed this task but scored 0 marks (see Student: 231012 as an example). This might suggest that these students had not mastered the competence in "access".

*Table 6.26 Percentage distributions of S2 students for each score of Q1 (Access) in Chinese Language PA*

| **Score (%)** | | | | | | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | **3.00** | **4.00** | **5.00** | **6.00** | | | | |
| 10.94 | 10.52 | 11.30 | 10.59 | 9.10 | 13.23 | 17.49 | 16.83 | 100 | 3.01 | (2.20) | 50.17 |

N=820

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 233005)

- Able to match literature works with their corresponding dynasties correctly (Access: 6 marks)
- Able to produce an appropriate title for the table (Manage: 2 marks)

| 朝代 | 文學作品（作者） |
|---|---|
| 魏晉南北朝 | 文心雕龍（劉勰） |
| 隋唐 | 古鏡記（王度） |
| 元代 | 梧桐雨（白樸），西廂記（王實甫） |
| 明 | 二拍 （凌濛初） |
| 清 | 紅樓夢（曹雪芹） |

(Student: 232007)

- This student miss-matched '西廂記' by Wang Shi-fu in Yuan Dynasty with Sui Tang Dynasty (Access: 4 marks)

| 朝代 | 文學作品（作者） |
|---|---|
| iv. 明 | iv. 二拍 （凌濛初） |
| v. 魏晉南北朝 | iii. 文心雕龍（劉勰） |
| i. 元 | ii.梧桐雨（白樸） |
| iii. 清 | v. 紅樓夢（曹雪芹） |
| ii. 隋唐 | i. 西廂記（王實甫） |

(Student: 231012)

- This student only reached the novice level in the "access" dimension (Access: 0 marks )

| 朝代 | 文學作品（作者） |
|---|---|
| 魏晉南北朝 | 紅樓夢（曹雪芹） |
| 隋唐 | 梧桐雨（白樸） |
| 元 | 文心雕龍（劉勰） |
| 明 | |
| 清 | |

The “manage” dimension of Q1 carried 7 marks. Students’ overall performance was good and performed better in the subtask ‘produce an appropriate title for the table’, with mean score percentage of 68.50%; followed by ‘name the file as 「文學作品」 (Literature works) and save it in the ‘My Documents’ folder’, with mean score percentage of 63.00%. Students performed the poorest in ‘arrange all the dynasties chronologically from the earliest to the latest’, with mean score percentage of 51.50%.

Students’ performance in ‘produce an appropriate title for the table’ was good (see Table 6.27). The mean score was 1.37 out of 2 and mean score percentage was 68.50%. 68.25% of the students were able to give appropriate titles for their tables and got full marks (see Student: 233005 as an example). 20.24% of the students completed this task but failed to use titles to organize the information (see Student: 232016 as an example).

*Table 6.27 Percentage distributions of S2 students for each score of Q1 (Manage_titles) in Chinese Language PA*

| **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | | | | |
| 20.24 | 10.52 | 0.99 | 68.25 | 100 | 1.37 | (0.92) | 68.50 |

N=820
N.B. - N listed in the table is the unweighted number of students.
- “Score (%)”, “Mean Score” and “SD” are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

Students’ performance in ‘name the file as 「文學作品」 (Literature works) and save it in the ‘My Documents’ folder’ was good as well (see Table 6.28). The mean score was 0.63 out of 1 and mean score percentage was 63.00%. 63.06% of the students were able to name the file correctly as「文學作品」(Literature works) and saved it in the ‘My Documents’ folder. 26.42% of the students completed this task but named the file incorrectly, e.g. Student 232012 named the file as 「朝代」 (Dynasties).

*Table 6.28 Percentage distributions of S2 students for each score of Q1 (Manage_ file naming and saving) in Chinese Language PA*

| **Score (%)** | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | | | | |
| 26.42 | 10.52 | 63.06 | 100 | 0.63 | (0.48) | 63.00 |

N=820
N.B. - N listed in the table is the unweighted number of students.
- “Score (%)”, “Mean Score” and “SD” are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 232016)

- Failed to use titles to categorize the information (Manage _titles: 0 marks)
- Able to arrange the dynasties chronologically from the earliest to the latest (Manage _sequence: 4 marks)

| | |
|---|---|
| 魏晉南北朝 | 文心雕龍（劉勰） |
| 隋唐 | 古鏡記（王度） |
| 元 | 西廂記（王實甫） |
| 明 | 梧桐雨（白樸） |
| 清 | 紅樓夢（曹雪芹） |

Students' performance in the subtask, 'arrange all the dynasties chronologically from the earliest to the latest' was satisfactory (see Table 6.29). The mean score was 2.06 out of 4 and mean score percentage was 51.50%. 45.78% of the students were able to arrange the dynasties in sequence correctly and got full marks (see Student: 232016 as an example). 15.62% of the students only scored between 1 and 3 marks because of erroneous sequence of dynasties (see Student: 233028 as an example). In addition, 28.08% of the students completed this task but scored 0 marks. These students copied the dynasties provided in the instructions into the table without arranging them accordingly (see Student: 229006 as an example).

*Table 6.29 Percentage distributions of S2 students for each score of Q1 (Manage_sequence) in Chinese Language PA*

| Score (%) | | | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | **3.00** | **4.00** | | | | |
| 28.08 | 10.52 | 10.38 | 3.24 | 2.00 | 45.78 | 100 | 2.06 | (1.87) | 51.50 |

N=820

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 233028)

- Wrong sequence of the dynasties (Manage_sequence: 1 mark)

| 朝代 | 文學作品（作者） |
|---|---|
| 元 | 西廂記（王實甫） |
| 隋唐 | 梧桐雨（白樸） |
| 魏晉南北朝 | 文心雕龍（劉勰） |
| 明 | 二拍 （凌濛初） |
| 清 | 紅樓夢（曹雪芹） |
| 隋唐 | 古鏡記（王度） |

(Student: 229006)

- This student copied the dynasties from the instructions without arranging them chronologically. (Manage_sequence: 0 marks)

| 朝代： | 文學作品 |
|---|---|
| 元 | 二拍 （凌濛初） |
| 隋唐 | 文心雕龍（劉勰） |
| 清 | 梧桐雨（白樸） |
| 明 | 西廂記（王實甫） |
| 魏晉南北朝 | 紅樓夢（曹雪芹）<br>古鏡記（王度） |

For the "create" dimension, students were required to create a table and match the various literature works with their corresponding dynasties. Students' overall performance was very good (see Table 6.30). The mean score was 1.64 out of 2 and the mean score percentage was 82.00%. 78.63% of the students got full marks (see Student: 233005 as an example), probably because most students referred to the hints given in the questions, thus they were able to use tables to present their answers. In addition, quite a lot of students used Excel to complete this task, because Excel could generate tables automatically. Once students categorized the information correctly, they got 2 marks for this task.

*Table 6.30 Percentage distributions of S2 students for each score of Q1 (Create) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| 0.00 (attempted the question) | 0.00 (did not attempt the question) | 1.00 | 2.00 | | | | |
| 4.52 | 10.52 | 6.33 | 78.63 | 100 | 1.64 | (0.73) | 82.00 |

N=820

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

## Special Schools

Special school students' overall performance in Q1 was fair with 70.83% of the students completed this task (see Appendix 6.3).

Students had poor performances in the "access" and "manage" dimensions of Q1. The mean score of "access" was 1.75 out of 6 and the mean score percentage was 29.17% (see Table 6.31).

*Table 6.31 Percentage distributions of Special school students for each score of Q1 (Access) in Chinese Language PA*

| Score (%) | | | | | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | **3.00** | **4.00** | **5.00** | **6.00** | | | | |
| 16.67 | 29.17 | 12.50 | 12.50 | 4.17 | 8.33 | 8.33 | 8.33 | 100 | 1.75 | (2.13) | 29.17 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

Among the three "manage" subtasks in the "manage" dimension, students performed the best in 'produce an appropriate title for the table', with mean score percentage of 62.50%; followed by 'name the file as 「文學作品」 (Literature works) and save it in the 'My Documents' folder', with mean score percentage of 42.00%. The poorest performance was found in 'arrange all the dynasties chronologically from the earliest to the latest', with mean score percentage of 32.25%.

Students' performance in 'produce an appropriate title for the table' was good (see Table 6.32a). The mean score was 1.25 out of 2 and mean score percentage was 62.50%. Excluding those 'not-reached' and 'non-response' students, 88.24% of the students were able to produce appropriate titles for the tables (see Table 6.32b).

*Table 6.32a Percentage distributions of Special school students for each score of Q1 (Manage_titles) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | | | | |
| 8.33 | 29.17 | 0.00 | 62.50 | 100 | 1.25 | (0.99) | 62.50 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

*Table 6.32b Percentage distributions of Special school students for each score of Q1 (Manage_titles) in Chinese Language PA (excluding those 'not-reached' and 'non-response' students)*

| Score (%) | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|
| **0.00** | **1.00** | **2.00** | | | | |
| 11.76 | 0.00 | 88.24 | 100 | 1.76 | (0.64) | 88.00 |

N=17
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

For the subtask of “manage”, ‘name the file as「文學作品」(Literature works) and save it in the ‘My Documents’ folder’, students’ performance was fair (see Table 6.33a). The mean score was 0.42 out of 1 and mean score percentage was 42.00%. Excluding those ‘not-reached’ and ‘non-response’ students, 58.82% of the students were able to name the document correctly and save it in the ‘My Documents’ folder (see Table 6.33b).

*Table 6.33a Percentage distributions of Special school students for each score of Q1 (Manage_file naming and saving) in Chinese Language PA*

| **Score (%)** | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1** | | | | |
| 29.17 | 29.17 | 41.67 | 100 | 0.42 | (0.50) | 42.00 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

*Table 6.33b Percentage distributions of Special school students for each score of Q1 (Manage_file naming and saving) in Chinese Language PA (excluded those ‘not-reached’ and ‘non-response’ students)*

| **Score (%)** | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|
| **0.00** | **1.00** | | | | |
| 41.18 | 58.82 | 100 | 0.59 | (0.49) | 59.00 |

N=17
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

Students’ performance in ‘arrange all the dynasties chronologically from the earliest to the latest’ was below average (see Table 6.34a). The mean score was 1.29 out of 4 and mean score percentage was 32.25%. Excluding those ‘not-reached’ and ‘non-response’ students, 35.29% of the students scored full marks. There were same proportion of students, i.e. 29.41%, scored 0 marks and 1 mark (see Table 6.34b).

*Table 6.34a Percentage distributions of Special school students for each score of Q1 (Manage_sequence) in Chinese Language PA*

| **Score (%)** | | | | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | **3.00** | **4.00** | | | | |
| 20.83 | 29.17 | 20.83 | 4.17 | 0.00 | 25.00 | 100 | 1.29 | (1.68) | 32.25 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

*Table 6.34b Percentage distributions of Special school students for each score of Q1 (Manage_sequence) in Chinese Language PA (excluding those 'not-reached' and 'non-response' students)*

| Score (%) | | | | | Total | Mean | (SD) | Mean Score |
|---|---|---|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | 3.00 | 4.00 | (%) | Score | | Percentage (%) |
| 29.41 | 29.41 | 5.88 | 0.00 | 35.29 | 100 | 1.82 | (1.69) | 45.50 |

N=17
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

For the "create" dimension, special school students' performance was satisfactory (see Table 6.35a). The mean score was 1.17 out of 2 and mean score percentage was 58.50%. Excluding those 'not-reached' and 'non-response' students, 76.47% of the students were able to create a table and got full marks (see Table 6.35b).

*Table 6.35a Percentage distributions of Special school students for each score of Q1 (Create) in Chinese Language PA*

| Score (%) | | | | Total | Mean | (SD) | Mean Score |
|---|---|---|---|---|---|---|---|
| 0.00 (attempted the question) | 0.00 (did not attempt the question) | 1.00 | 2.00 | (%) | Score | | Percentage (%) |
| 8.33 | 29.17 | 8.33 | 54.17 | 100 | 1.17 | (0.96) | 58.50 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

*Table 6.35b Percentage distributions of Special school students for each score of Q1 (Create) in Chinese Language PA (excluding those 'not-reached' and 'non-response' students)*

| Score (%) | | | Total | Mean | (SD) | Mean Score |
|---|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | (%) | Score | | Percentage (%) |
| 11.76 | 11.76 | 76.47 | 100 | 1.65 | (0.68) | 82.50 |

N=17
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 304001)

- Students scored full marks.

| 朝代 | 文學作品(作者) |
|---|---|
| 魏晉南北朝 | 文心雕龍（劉勰） |
| 唐朝 | 古鏡記（王度） |
| 元代 | 梧桐雨（白樸） |
| 元代 | 西廂記（王實甫） |
| 明代 | 二拍 （凌濛初） |
| 清 1754 年 | 紅樓夢（曹雪芹） |

***Question 2***

Q2 required the students to use online resources to look for the pronunciations of the Chinese words. Students were required to compare them with similar words or words of similar pronunciations and choose a correct answer (i.e.「讀書」 and「尺牘」). This question assessed students on their competence in the "access" dimension. Almost all students answered this question (response rate of secondary school was 99.89%, special school was 100%; see Appendices 6.2 & 6.3 for details). Secondary school students' performance was satisfactory (see Table 6.36). The mean score was 2.10 out of 4 and mean score percentage was 52.50%, amongst whom 26.12% of the students got full marks. Special school students' performance was fair (see Table 6.37). The mean score was 1.67 out of 4 and mean score percentage was 41.75%, amongst whom 25.00% of the students got full marks. A number of students got only 2 marks (53.06% of the secondary students and 33.33% of the special students) mainly because they thought there was only one correct answer for this question.

*Table 6.36 Percentage distributions of Secondary school students for each score of Q2 (Access) in Chinese Language PA*

| **Score (%)** | | | | **Total** | **Mean** | **(SD)** | **Mean Score** |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **2.00** | **4.00** | **(%)** | **Score** | | **Percentage (%)** |
| 20.80 | 0.11 | 53.06 | 26.12 | 100 | 2.10 | (1.37) | 52.50 |

N=820

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

*Table 6.37 Percentage distributions of Special school students for each score of Q2 (Access) in Chinese Language PA*

| **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **2.00** | **4.00** | | | | |
| 41.67 | 0.00 | 33.33 | 25.00 | 100 | 1.67 | (1.63) | 41.75 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

***Question 3***

Q3 consisted of three inter-related sub-questions. Q3.1 assessed students on their competence in the “evaluate” dimension. It required students to choose from all the different meanings in the dictionary, the correct meaning of the word 「釋」 in a particular sentence. Q3.2 assessed students on their competence in the “access” dimension. It required students to look for the meaning of the word using appropriate online dictionaries. Q3.3 assessed students on their competence in the “define” dimension. It required students to jot down the keywords used for searching. The following section presents students’ performance in secondary school, followed by that of the special schools.

**Question 3.1**

Q3.1 required students to choose from all the different meanings in the dictionary, the correct meaning of the word 「釋」 in a particular sentence. 97.25% of the secondary school students and 91.67% of the special school students responded to this question respectively (see Appendices 6.2 & 6.3). Secondary school students’ performance of Q3.1 was below average (see Table 6.38). The mean score was 2.16 out of 6 and mean score percentage was 36.00%. Special school students ‘performance was very poor (see Table 6.39). The mean score was 0.54 out of 6 and mean score percentage was 9.00%. Only a few students, 3.45% of secondary school students and 4.17% of special school students, could get full marks. There were 24.61% of the secondary school students and 75.00% of the special school students scored 0 marks. In general, both groups of students performed relatively poorly in this question.

Among the 3 subtasks of Q3.1, many students were unable to find the meaning of the word「釋」of the phrase 「釋門」. The most frequent mistake students made was giving the meaning of the entire phrase or even the entire sentence. For instance, many students explained the meaning of the phrase「闡釋」 instead of the word「釋」. A few students even used English to explain this word, e.g. giving ‘explain’ for「闡釋」. It could be inferred that quite a lot of students were weak in judging the digital information collected accurately.

*Table 6.38 Percentage distributions of Secondary school students for each score of Q3.1 (Evaluate) in Chinese Language PA*

| Score (%) | | | | | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | **3.00** | **4.00** | **5.00** | **6.00** | | | | |
| 24.61 | 2.75 | 8.20 | 23.42 | 14.23 | 18.95 | 4.38 | 3.45 | 100 | 2.16 | (1.73) | 36.00 |

N=820
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

*Table 6.39 Percentage distributions of Special school students for each score of Q3.1 (Evaluate) in Chinese Language PA*

| Score (%) | | | | | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | **3.00** | **4.00** | **5.00** | **6.00** | | | | |
| 75.00 | 8.33 | 0.00 | 8.33 | 4.17 | 0.00 | 0.00 | 4.17 | 100 | 0.54 | (1.41) | 9.00 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 219018)

- This student was able to use the online dictionary to find the different meanings of the word 「釋」(Evaluate: 6 marks)

| |
|---|
| 1.解釋　　2.放下　　3.佛教 |

(Student: 221010)

- This student explained the entire sentence rather than the meaning of the word. (Evaluate: 5 marks)

| |
|---|
| i.解釋、注解　　ii.喜歡得捨不得放手　　iii.出家人 |

(Student: 224018)

- This student used English to explain the meaning of a Chinese word. (Evaluate: 4 marks)

| | |
|---|---|
| i. | to clearly explain; to expound; to interpret |
| ii. | 喜歡得捨不得放手。文明小史 • 第二十二回：鄧門上一見雕鏤精工，愛不釋手。 |
| iii. | 1) 佛教。阿毘達磨俱舍論 • 卷七：不越釋門，因緣正理。<br>2) 出家人。初刻拍案驚奇 • 卷二十八：雖讀儒書，卻又酷好佛典，敬重釋門，時常瞑目打坐，學那禪和子的模樣。 |

**Question 3.2**

Q3.2 required students to look for the meaning of the word using appropriate online dictionaries and note down all website addresses they used in searching for answers of Q3.1. The response rates were 96.96% for secondary school and 91.67% for special school. Secondary school students' performance was good (see Table 6.40). The mean score was 1.2 out of 2 and mean score percentage was 60.50%. Special school students' performance was very poor (see Table 6.41). The mean score was 0.33 out of 2 and mean score percentage was 16.50%.

For secondary school students, 52.48% of them got full marks and 16.51% got 1 mark. 27.98% of the students answered this question but got 0 marks because they gave nonsense answers (see Student: 219023 as an example). For special school students, 16.67% of the students got full marks and 75.00% of the students answered the question but got 0 marks. These students did not seem to understand the requirement of this task at all. Most of them gave irrelevant answers (see Student: 303012 as an example).

*Table 6.40 Percentage distributions of Secondary school students for each score of Q3.2 (Access) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| 0.00 (attempted the question) | 0.00 (did not attempt the question) | 1.00 | 2.00 | | | | |
| 27.98 | 3.04 | 16.51 | 52.48 | 100 | 1.21 | (0.89) | 60.50 |

N=820

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

*Table 6.41 Percentage distributions of Special school students for each score of Q3.2 (Access) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| 0.00 (attempted the question) | 0.00 (did not attempt the question) | 1.00 | 2.00 | | | | |
| 75.00 | 8.33 | 0.00 | 16.67 | 100 | 0.33 | (0.76) | 16.50 |

N=24

N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 227005)

- This student was able to write down the website address used in Q3.1 (Access: 2 marks)

| |
|---|
| http://140.111.34.46/dict/ |

(Student: 2190023)

- Nonsense answer (Access: 0 marks)

| |
|---|
| 我的腦袋 |

(Student: 303012)

- This student did not seem to understand the requirement of the task, therefore provided irrelevant answers. (Access: 0 marks)

| |
|---|
| 小芳在書店找到這本書，愛不釋手。 |

**Question 3.3**

Q3.3 required students to jot down the keywords they used to look for the meaning of the word in dictionaries. The response rates were 96.42% for secondary school students and 91.67% for special school students. The performance of secondary students was satisfactory (see Table 6.42). The mean score was 1.12 out of 2 and the mean score percentage was 56.00%. Special school students' performance was below average (see Table 6.43). The mean score was 0.71 and the mean score percentage was 35.50%.

36.18% of the secondary school students and 25.00% of the special school students got full marks for this question respectively. They were able to use simple and accurate keywords (i.e.「釋」) to search information (see Student: 219017 as an example). 40.03% of the secondary students and 20.83% of the special school students got 1 mark; they used the entire phrase instead of the word「釋」 to search for information. Student 219007, for instance, used「闡釋」,「愛不釋手」 and「釋門中人」 as keywords for searching. Furthermore, there were 20.21% of the secondary school students and 45.83% of the special school students attempted this question but got 0 marks. Most of them gave irrelevant answers. For instance, Student 233010 wrote down「中文字典」(Chinese dictionaries). It seemed that this student had not mastered the competence in "define".

*Table 6.42 Percentage distributions of Secondary school students for each score of Q3.3 (Define) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| 0.00 (attempted the question) | 0.00 (did not attempt the question) | 1.00 | 2.00 | | | | |
| 20.21 | 3.58 | 40.03 | 36.18 | 100 | 1.12 | (0.76) | 56.00 |

N=820

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

*Table 6.43 Percentage distributions of Special school students for each score of Q3.3 (Define) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| 0.00 (attempted the question) | 0.00 (did not attempt the question) | 1.00 | 2.00 | | | | |
| 45.83 | 8.33 | 20.83 | 25.00 | 100 | 0.71 | (0.86) | 35.50 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

***Question 4***

Q4 required students to write an email to teachers using appropriate register, to report the morals of the story 「買櫝還珠」 and at the end requested for teachers' comments. This question assessed students on their competences in the "integrate" (4 marks) and "communicate" (5 marks) dimensions.

**Secondary Schools**

Over 90% of the students (91.22% - 92.79%) attempted this question (see Appendix 6.2). Q4 carried 4 marks for "integrate", in which 2 marks would be given to 'include the two main points in the email'; and another 2 marks to 'induce the morals of the story 「買櫝還珠」 completely'. Students' performance was better in the task 'include the two main points within the mail', with mean score percentage of 40.50%; followed by the task 'induce the morals of the story 「買櫝還珠」 completely', with the mean score percentage of 25.50%.

For the task 'include the two main points within the email', students' performance was fair (see Table 6.44). The mean score was 0.81 out of 2. 15.87% of the students got 2 marks and 49.48% of the students got 1 mark. They were able to present the morals of the story in the email, but failed to request for teachers' comments (see Student: 231002 as an example). 26.78% of the students attempted the question but got 0 marks as most of them directly copied information from the Internet and did not request for teachers' comments (see Student: 232020 as an example).

*Table 6.44 Percentage distributions of Secondary school students for each score of Q4 (Integrate_content) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| 0.00 (attempted the question) | 0.00 (did not attempt the question) | 1.00 | 2.00 | | | | |
| 26.78 | 7.88 | 49.48 | 15.87 | 100 | 0.81 | (0.69) | 40.50 |

N=820
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

For the task ‘induce the morals of the story 「買櫝還珠」 completely’, students’ overall performance was poor (see Table 6.45). The mean score was 0.51 out of 2 and the mean score percentage was 25.50%. Only 9.34% of them got the full score (see Student: 231002 as an example); 32.10% of the students got 1 mark. 50.68% of the students attempted this question but got 0 marks (see Student: 232020 as an example), with most of them just listed out the gist of the story 「買櫝還珠」, but failed to point out its morals. Some students were unable to score because they interpreted the story with their own imagination and created illogic morals.

*Table 6.45 Percentage distributions of Secondary school students for each score of Q4 (Integrate_morals) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | | | | |
| 50.68 | 7.88 | 32.10 | 9.34 | 100 | 0.51 | (0.66) | 25.50 |

N=820
N.B. - N listed in the table is the unweighted number of students.
- “Score (%)”, “Mean Score” and “SD” are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

The “communicate” dimension carried 5 marks. Students performed the best in ‘fill in the subject of the email explicitly’ and ‘fill in the email recipient correctly’, with the mean score percentages of 79.00% and 62.00% respectively; followed by ‘addressing the recipient and sender’ and ‘communicate with teachers with appropriate register and standard written Chinese’, with mean score percentages of 23.00% and 18.50% respectively. In general, students’ performance in “communicate” was poor. They just reached the “basic” level and were not able to complete tasks demanding higher competence level.

For the task ‘fill in the subject of the email explicitly’, students’ performance was very good (see Table 6.46). The mean score was 0.79 out of 1 and the mean score percentage was 79.00%. 79.18% of the students were able to put in an explicit subject for the email and got full marks.

*Table 6.46 Percentage distributions of Secondary school students for each score of Q4 (Communicate_subject) in Chinese Language PA*

| Score (%) | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | | | | |
| 12.84 | 7.98 | 79.18 | 100 | 0.79 | (0.41) | 79.00 |

N=820
N.B. - N listed in the table is the unweighted number of students.
- “Score (%)”, “Mean Score” and “SD” are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

For the task ‘fill in the email recipient correctly’, students’ performance was good (see Table 6.47). The mean score was 0.62 out of 1 and the mean score percentage was 62.00%. 61.56% of the students were able to put in the correct email address and score full marks, probably because these students had experience in writing and sending emails in their real life and thus were able to complete this task fairly easily.

*Table 6.47 Percentage distributions of Secondary school students for each score of Q4 (Communicate_email address) in Chinese Language PA*

| Score (%) | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|
| 0.00 (attempted the question) | 0.00 (did not attempt the question) | 1.00 | | | | |
| 31.22 | 7.21 | 61.56 | 100 | 0.62 | (0.49) | 62.00 |

N=820
N.B. - N listed in the table is the unweighted number of students.
- “Score (%)”, “Mean Score” and “SD” are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

Students’ performance of the task ‘addressing the recipient and sender’ was poor (see Table 6.48). The mean score was 0.23 out of 1 and the mean score percentage was 23.00%. 22.68% of the students got full marks (see Student: 230023 as an example). 69.45% of the students attempted this question but got 0 marks. Most students ignored the email format, failed to address the recipient at the beginning or salute and sign at the end (see Student: 231002 as an example).

*Table 6.48 Percentage distributions of Secondary school students for each score of Q4 (Communicate_recipient & signature) in Chinese Language PA*

| Score (%) | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|
| 0.00 (attempted the question) | 0.00 (did not attempt the question) | 1.00 | | | | |
| 69.45 | 7.88 | 22.68 | 100 | 0.23 | (0.42) | 23.00 |

N=820
N.B. - N listed in the table is the unweighted number of students.
- “Score (%)”, “Mean Score” and “SD” are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

Students’ performance in ‘communicate with teachers with appropriate register and standard written Chinese’ was very poor (see Table 6.49). The mean score was 0.37 out of 2 and the mean score percentage was 18.50%. Only 15.06% of the students were able to communicate with teachers with polite and appropriate register and got 2 marks (see Student: 230023 as an example). 69.73% of the students attempted Q4 but got 0 marks, with most of them directly copied the online information about the story into their emails, ignoring the requirements of the task, i.e. ‘using appropriate register to request for teachers’ comments on the accuracy of your information’. Their emails did not show any communication between the student and the teacher, indicating rather weak contextual awareness (see Student: 231002 as an example).

*Table 6.49 Percentage distributions of Secondary school students for each score of Q4 (Communicate_manner) in Chinese Language PA*

| **Score (%)** | | | | **Total** | **Mean** | **(SD)** | **Mean Score** |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted)** | **0.00 ( did not attempt )** | **1.00** | **2.00** | **(%)** | **Score** | | **Percentage (%)** |
| 69.73 | 8.78 | 6.43 | 15.06 | 100 | 0.37 | (0.73) | 18.50 |

N=820
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 231002)
- Included the morals of the story but failed to request for teachers' comment (Integrate _ content: 1 score)
- Able to induce the morals of the story 「買櫝還珠」 (Integrate _morals: 2 scores)
- Did not salute the recipient nor sign at the end (Communicate_recipient & signature: 0 score)
- Showed no awareness of communication (Communicate_manner: 0 score)

| |
|---|
| 買了裝在漂亮木盒子裏的珍珠，卻留下木盒子把珍珠還給對方，比喻被華麗的外表所迷惑而放棄了珍貴的實質。也比喻沒有眼光，取捨不當。 |

(Student: 232020)
- Failed to induce the morals or request for teachers' comments (Integrate_ content: 0 score)
- Only listed the gist of the story, but failed to point out its morals (Integrate _morals: 0 score)

| |
|---|
| 一個楚國人,有一顆漂亮的珍珠,打算把這顆珍珠賣出去。為了賣個好價錢，他便動腦筋要將珍珠好好包裝一下。　使用名貴的木料，香料,精雕細琢,刻花紋...　那些人都欣賞他的盒子,買了他的盒子,把珠子還給了楚國人... |

(Student: 230023)
- Able to address the recipient at the beginning or salute and sign at the end (Communication _recipient & signature: 2 scores)
- Able to communicate with teachers with polite and appropriate register (Communication_ manner: 2 scores)

| |
|---|
| 親愛的老師，<br>請問「買櫝還珠」的寓意是否如下？<br>人們只會看物件的外表，有時卻忽略了物件的內裡。<br>請老師批評指正。有空，請回信。謝謝。<br>子螢敬上 |

## Special Schools

Special school students' performance in Q4 was worse than that of the secondary school students. 16.67% to 20.83% of the students did not attempt this question at all, probably because of insufficient time or other reasons (see Appendix 6.3).

Students' performance in "integrate" was poor. For the task 'include the two main points in the email', the mean score percentage was 23.00%; and for 'induce the morals of the story 「買櫝還珠」completely', the mean score percentage was 21.00%.

For the task 'include the two main points in the email', students' performance was poor (see Table 6.50). The mean score was 0.46 out of 2 and the mean score percentage was 23.00%. No students got full marks whereas 45.83% of the students got 1 mark as they failed to request for teachers' comments (see Student: 303003 as an example). Another 37.50% of the students attempted this question but got 0 marks, with most of them only searched for information about the story on the Internet and copied it directly to the email, without pointing out the morals or requesting for teachers' comments (see Student: 303009 as an example).

*Table 6.50 Percentage distributions of Special school students for each score of Q4 (Integrate_content) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | | | | |
| 37.50 | 16.67 | 45.83 | 0.00 | 100 | 0.46 | (0.51) | 23.00 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

As for the task 'induce the morals of the story「買櫝還珠」completely', students' performance was poor (see Table 6.51). The mean score was 0.42 out of 2 and the mean score percentage was 21.00%. 16.67% of the students got full marks (see Student: 303003 as an example). 54.17% of the students attempted but scored 0 marks, with most of them failed to further process the information collected. They presented the gist of the story, but did not point out the morals of the story (see Student: 303009 as an example).

*Table 6.51 Percentage distributions of Special school students for each score of Q4 (Integrate_morals) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | | | | |
| 54.17 | 20.83 | 8.33 | 16.67 | 100 | 0.42 | (0.78) | 21.00 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

Similar to secondary school students, special school students' overall performance in "communicate" was poor. Students seemed to attain only the basic level of competence in the "communicate" dimension, and were unable to perform well on tasks demanding higher level of competence.

For the task 'fill in the subject of the email explicitly', students' performance was good (see Table 6.52). The mean score percentage was 63.00%. 62.50% of the students were able to fill in an explicit subject for their emails and got full marks. For the task 'fill in the email recipient correctly', students' performance was satisfactory (see Table 6.53) and the mean score percentage was 50.00%. 50.00% of the students were able to put in the correct email recipient and got full marks.

*Table 6.52 Percentage distributions of Special school students for each score of Q4 (Communicate_subject) in Chinese Language PA*

| Score (%) | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | | | | |
| 20.83 | 16.67 | 62.50 | 100 | 0.63 | (0.49) | 63.00 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

*Table 6.53 Percentage distributions of Special school students for each score of Q4 (Communicate_email address) in Chinese Language PA*

| **Score (%)** | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | | | | |
| 33.33 | 16.67 | 50.00 | 100 | 0.50 | (0.51) | 50.00 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

Students' performance in the task 'addressing the recipient and the sender' was very poor (see Table 6.54). The mean score was 0.08 out of 1 and the mean score percentage was 8.00%. Only 8.33% of the students got 1 mark. 75.00% of the students attempted this question but got 0 marks. Most of them did not use an appropriate email format and style and did not address the recipient or sender (Student: 303009).

*Table 6.54 Percentage distributions of Special school students for each score of Q4 (Communicate_ recipient & signature) in Chinese Language PA*

| **Score (%)** | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | | | | |
| 75.00 | 16.67 | 8.33 | 100 | 0.08 | (0.28) | 8.00 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

For the task 'communicate with teachers with appropriate register and standard written Chinese', students' performance was very poor (see Table 6.55). The mean score was 0.13 out of 2 and the mean score percentage was 6.50%. Only 4.17% of the students got full marks. 75% of the students attempted this question but scored 0 marks. These students only copied and pasted information collected from the Internet about the story 「買櫝還珠」into the email, but ignored the communication requirement of the task. Their emails did not show any communication between the students and the teacher (see Student: 303009 as an example).

*Table 6.55 Percentage distributions of Special school students for each score of Q4 (Communicate_manner) in Chinese Language PA*

| **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | | | | |
| 75.00 | 16.67 | 4.17 | 4.17 | 100 | 0.13 | (0.45) | 6.50 |

N=24

N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 303003)

- The email failed to include a request for teachers' comment (Integrate _content: 1 mark)
- Able to induce the morals of the story (Integrate _morals: 2 marks)

買了裝在漂亮木盒子裏的珍珠，卻留下木盒子把珍珠還給對方，比喻被華麗的外表所迷惑而放棄了珍貴的實質。也比喻沒有眼光，取捨不當。

(Student: 303009)

- Failed to point out the morals of the story and failed to request for teachers' comments (Integrate _content: 0 marks)
- Unable to induce the morals (Integrate_ morals: 0 marks)
- Failed to address the recipient at the beginning and to sign at the end (Communicate_ recipient and signature: 0 marks)
- Lack communication with the teacher (Communicate _manner: 0 marks)

古時有一個楚國人到鄭國去賣珠寶，用含有香味的木蘭樹爲珍珠造了一個盒子，盒子不但以肉桂、花椒等香料薰製，還用美玉和翡翠來裝飾。有個鄭國人路過，看見這個盒子，愛不釋手，最終把盒子買下來，卻把盒中的珍珠還給了楚國人。

***Question 5***

Q5 required students to use appropriate texts, pictures, or special effects to create a creative PowerPoint file to present the story 「買櫝還珠」, which would be used as teaching material to P3 students. Q5 assessed students on their competence in "create" (4 marks), "integrate" (6 marks) and "manage" dimensions (2 marks).

**<u>Secondary Schools</u>**

34.50% of the students did not respond to this question at all, probably because of the insufficient time or other reasons (see Appendix 6.2).

The "create" dimension in Q5 required students to design a PowerPoint file for primary 3 students by using pictures or others special effects. Students' performance on this task was poor (see Table 6.56). The mean score was 0.87 out of 4 and the mean score percentage was 21.75%. 11.09% of the students scored between 3 and 4 marks. These students were able to use three or more special effects in their PowerPoint files (see Student: 205017 as an example). In addition, 34.96% of the students scored between 1 and 2 marks. 19.44% of them attempted this question but got 0 marks. Students' poor performance was probably because of insufficient time so they just finished it in a hurry, e.g. giving a title in their PowerPoint file without any content (see Student: 203024 as an example).

*Table 6.56 Percentage distributions of Secondary school students for each score of Q5 (Create) in Chinese Language PA*

| **Score (%)** | | | | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | **3.00** | **4.00** | | | | |
| 19.44 | 34.50 | 18.41 | 16.55 | 8.58 | 2.51 | 100 | 0.87 | (1.12) | 21.75 |

N=820
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

The "integrate" dimension in Q5 carried 6 marks. 2 marks would be awarded upon presenting a complete story content starting with 'retelling the story of 「買櫝還珠」, followed by stating its morals'. 4 marks would be awarded to 'the appropriateness of the content for the target P3 students, not simply cutting and pasting information from the original source'. Students' performance in the first aspect of "integrate" was fair with the mean score percentage of 41.00%. Their performance in the second aspect was poor and the mean score percentage was 22.25%.

For the task 'retelling the story of 「買櫝還珠」, followed by stating its morals', students' performance was fair (see Table 6.57). The mean score was 0.82 out of 2 and mean score percentage was 41.00%. 29.85% of students got full marks. They were able to retell the story and then pointed out its morals (see Student 203025 as an example). 22.63% of the students got 1 mark. Their PowerPoint files lacked either the story content or the moral (see Student 205020 as an example). 13.02% of the students attempted Q5 but got 0 marks. Most of them failed to complete the content because of insufficient time. Some PowerPoint files only had a title but no supporting content (see Student: 204013 as an example).

*Table 6.57 Percentage distributions of Secondary school students for each score of Q5 (Integrate_content) in Chinese Language PA*

| **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | | | | |
| 13.02 | 34.50 | 22.63 | 29.85 | 100 | 0.82 | (0.86) | 41.00 |

N=820
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

Students' performance on task 'the appropriateness of the content for the target P3 students, not simply cutting and pasting information from the original source' was poor (see Table 6.58). The mean score was 0.89 out of 4 and the mean score percentage was 22.25%. Only 3.39% of the students got 3 to 4 marks. Their PowerPoint files showed awareness of the target readers; the content was precise and concise (see Student: 203025 as an example). 49.10% of the students got 1 to 2 marks. Most of them did not select and organized the materials collected, but merely copied them from the original source. Thus the content of their PowerPoint files was too difficult and complicated for the P3 students (see Student: 203022 as an example). Another 13.02% of the students attempted this question but got 0 marks probably because they were not able to complete the content of PowerPoint files due to insufficient time (see Student: 204013 as an example).

*Table 6.58 Percentage distributions of Secondary school students for each score of Q4 (Integrate_information filtering) in Chinese Language PA*

| **Score (%)** | | | | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | **2.00** | **3.00** | **4.00** | | | | |
| 13.02 | 34.50 | 20.03 | 29.07 | 3.15 | 0.24 | 100% | 0.89 | (0.95) | 22.25 |

N=820
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

The "manage" dimension carried a total of 2 marks, with 1 mark given to 'name the PowerPoint file as「買櫝還珠」and save it correctly'. Another mark would be given to 'use titles to manage the content of the PowerPoint file'. Students' performances in the two aspects were satisfactory, with the same mean score percentages of 52.00%.

For the task 'name the PowerPoint as 「買櫝還珠」 and saved it correctly', students' performance was satisfactory (see Table 6.59a). The mean score was 0.52 out of 1 and the mean score percentage was 52.00%. More than half (52.44%) of the students got full marks. As there were 34.50% of the students who did not attempt this question, there were actually 80.06% of students who attempted the question got full marks (see Table 6.59b).

*Table 6.59a Percentage distributions of Secondary school students for each score of Q5 (Manage_ file naming and saving) in Chinese Language PA*

| Score (%) | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | | | | |
| 13.06 | 34.50 | 52.44 | 100 | 0.52 | (0.50) | 52.00 |

N=820
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

*Table 6.59b Percentage distributions of Secondary school students for each score of Q5 (Manage_file naming and saving) in Chinese Language PA (excluding those 'not-reached' and 'non-response' students)*

| Score (%) | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|
| **0.00** | **1.00** | | | | |
| 19.94 | 80.06 | 100 | 0.80 | (0.40) | 80.00 |

N=583
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

For the task 'use titles to manage the content of the PowerPoint file', students' performance was satisfactory (see Table 6.60a). The mean score was 0.52 out of 1 and the mean score percentage was 52.00%. More than half (51.62%) of the students got full marks (see Student: 203025 as an example). As there were 34.50% of the students who did not attempt this question, there were actually 78.81% of students who attempted the question got full marks, reflecting that students were very good in "manage" and their ability to use existing organization methods to manage digital information (see Table 6.60b).

*Table 6.60a Percentage distributions of Secondary school students for each score of Q5 (Manage_titles) in Chinese Language PA*

| Score (%) | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | | | | |
| 13.88 | 34.50 | 51.62 | 100 | 0.52 | (0.50) | 52.00 |

N=820
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

*Table 6.60b Percentage distributions of Secondary school students for each score of Q5 (Manage_titles) in Chinese Language PA (excluding those 'not-reached' and 'non-response' students)*

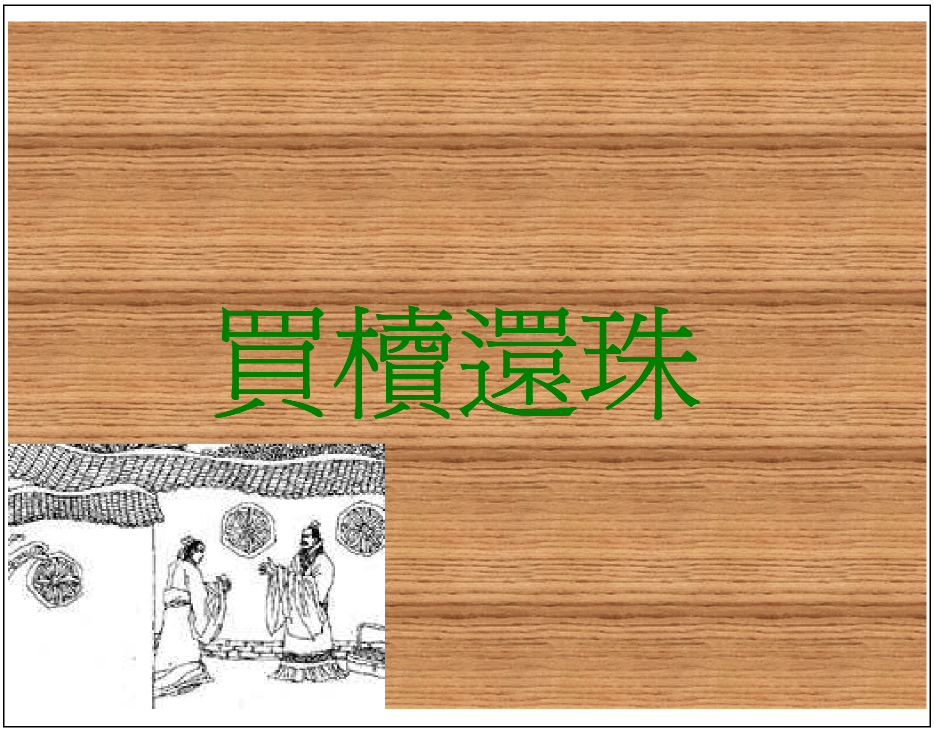
| **Score (%)** | | **Total** | **Mean** | **(SD)** | **Mean Score** |
|---|---|---|---|---|---|
| **0.00** | **1.00** | **(%)** | **Score** | | **Percentage (%)** |
| 21.19 | 78.81 | 100 | 0.79 | (0.41) | 79.00 |

N=583

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 205017)

- This student adopted four special effects in the PowerPoint file, i.e. background, colours, pictures and slide transitions (Create: 4 marks)



楚國有個珠寶商人，到鄭國去賣寶珠。他用名貴的有香味的木料雕了一只盒子，又想方設法把盒子裝飾得十分美觀，然后把寶珠裝在里面。有個鄭國人出高价買了去。他打開盒子，發現里邊放著許多寶珠，就把寶珠還給了珠寶商人，只留下了盒子。

盒子做得太好看了，那個鄭國人只看中了盒子，不曉得寶珠的价值比盒子貴出許多倍。

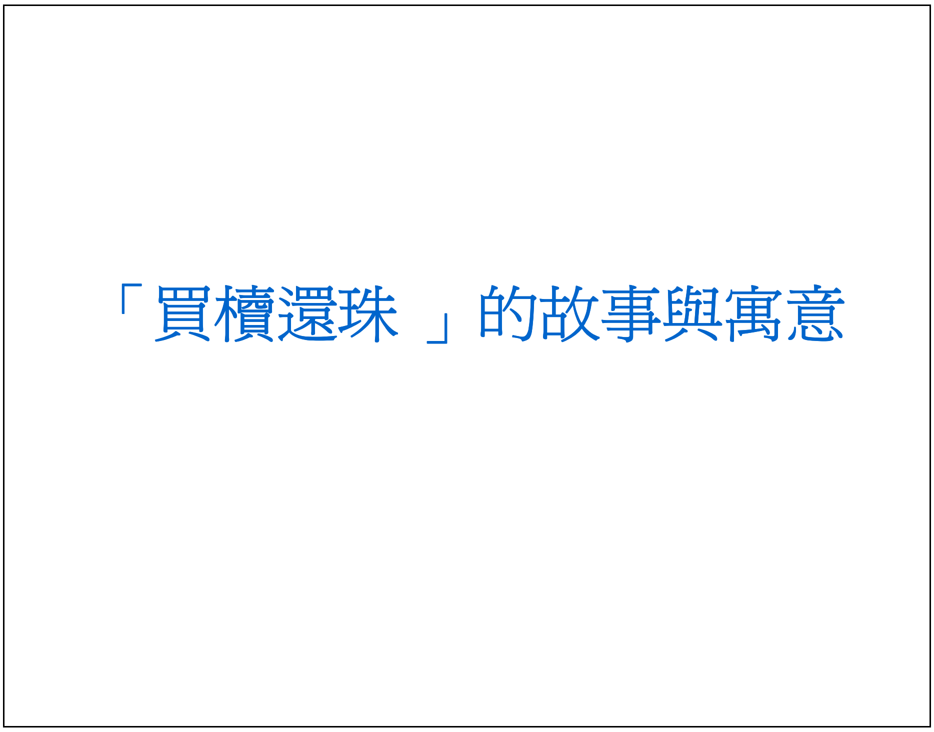
這成語的含意是指人不著重內涵，而著重外表包裝。現在許多年青人一味追求名牌，而不著重個人的增值和修養，以爲用名牌就可提高自己的身份。這種思想就是買櫝還珠，最終亦只是將自己塑造成綉花枕頭而已

(Student: 203024)

- No special effects was used in this PowerPoint file (Create: 0 marks)


(Student: 203025)

- The PowerPoint file started with retelling the story and followed by its morals. (Integrate_content: 2 marks)
- The PowerPoint file showed awareness of the target readers; its content was precise and concise. (Integrate_information filtering: 4 marks)
- The PowerPoint file made good use of titles (Manage _ titles: 1 mark)



# 故事簡介

故名思意，櫝代表木製的盒子，而珠代表珍珠。

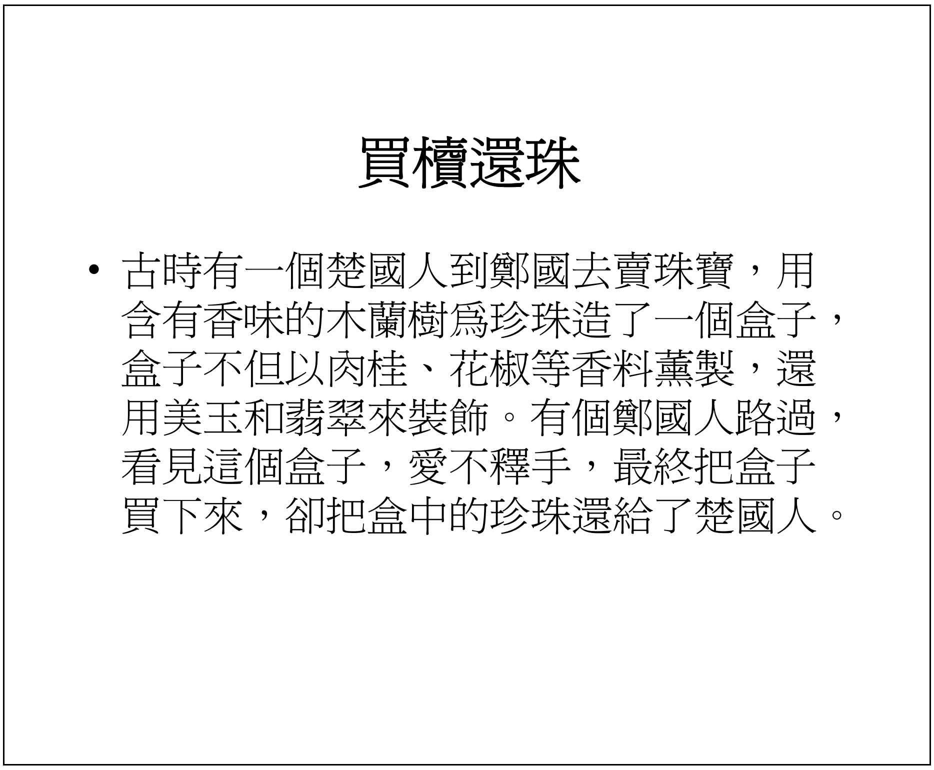
楚國一位珠寶商人到鄭國賣珠寶，他把盒子裝飾得很漂亮，一人出高價買去，但他只看中精美的盒子，遂將珍珠還給珠寶商。

# 故事的寓意

珠寶商人因只注重盒子的外表，只忽略了珍珠的價值，捨本逐末，取捨失當

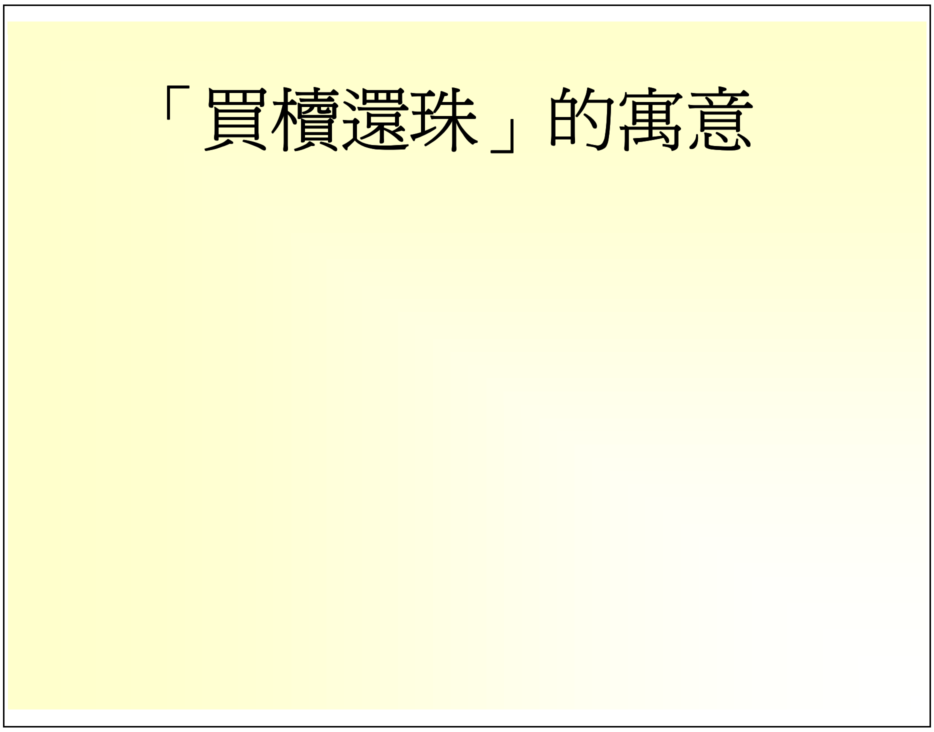
(Student: 205020)

- The PowerPoint file presented only the story but not its morals (Integrate _content: 1 mark)




(Student: 204013)

- This PowerPoint file only had a title but no supporting content (Integrate_content: 0 marks)



(Student: 203022)

- This student did not organize the information collected, he/she simply copied from the originals; its content was not suitable for P3 students (Integrate_information filtering: 1 mark)

買櫝還珠

買櫝還珠

- 從前有一個楚國人，他有一顆漂亮的珍珠，打算把這顆珍珠賣出去。爲了賣個好價錢，他便動腦筋要將珍珠好好包裝一下。這個楚國人使用名貴的木料，又請來手藝精湛的工匠，爲珍珠製造了一個盒子，用香料把盒子弄得芳香撲鼻。然後在盒子的外面精雕細琢，刻了許多好看的花紋，還鑲上漂亮的花邊，看上去，閃閃生光，實在是一件美輪美奐的工藝品。楚國人將珍珠小心翼翼地放進盒子後，便拿到市場上去賣。到了市場不久，很多人都圍上來欣賞楚人的盒子。一個鄭國人對盒子愛不釋手，出高價將楚人的盒子買下。鄭人付錢後，便拿著盒子離開了。可是沒走幾步他又回來。鄭人走到楚人跟前，將盒子裏的珍珠取出來交給楚人說：「先生，您將一顆珍珠遺留在盒子裏了，我特意回來交還的。」於是鄭人將珍珠交回了給楚人，然後低著頭一邊欣賞著木盒子，一邊離開了。楚人拿著被退回的珍珠，一臉靦腆，十分尷尬地站在那裏。他原本以爲別人會欣賞他的珍珠，可是沒想到包裝的盒子太過精美，令人只想買走盒子，忽略了珍珠的價值。

影片

- www.baby.com.cn/list/505_3.htm

**<u>Special Schools</u>**

54.17% of the students did not respond to Q5, probably because of short of time or other reasons (see Appendix 6.3). Students' performance in "create" was very poor (see Table 6.61). The mean score was 0.38 out of 4 and the mean score percentage was 9.50%. No students got full marks. 12.50% of the students got 2 marks. They adopted two special effects in their PowerPoint file (see Student: 303007 as an example). 12.50% of the students adopted one special effect and got 1 mark. 20.83% of the students created their PowerPoint files but scored 0 marks, indicating that quite a number of students had not master the competence in "create" (see Student: 303008 as an example).

*Table 6.61 Percentage distributions of Special school students for each score of Q5 (Create) in Chinese Language PA*

| Score (%) | | | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|---|---|
| 0.00 (attempted the question) | 0.00 (did not attempt the question) | 1.00 | 2.00 | 3.00 | 4.00 | | | | |
| 20.83 | 54.17 | 12.50 | 12.50 | 0.00 | 0.00 | 100 | 0.38 | (0.71) | 9.50 |

N=24

N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

The "integrate" dimension in Q5 carried 6 marks, students' performances in 'retelling the story of 「買櫝還珠」, followed by stating its morals' and 'the appropriateness of the content for the target P3 students, not simply cutting and pasting information from the original source' were very poor, with the mean score percentages of 16.50% and 8.25% respectively

Students performed very poorly in the task ‘retelling the story of 「買櫝還珠」, followed by stating its morals’ (see Table 6.62). The mean score was 0.33 out of 2. No students got full marks. 33.33% of the students got only 1 mark. The PowerPoint files they created lacked either the story or moral part (see Student: 303011 as an example). 12.50% of the students created the PowerPoint files but were not able to score at all, probably due to insufficient time to finish the content (see Student: 302005 as an example).

*Table 6.62 Percentage distributions of Special school students for each score of Q5 (Integrate_content) in Chinese Language PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| 0.00 (attempted the question) | 0.00 (did not attempt the question) | 1.00 | 2.00 | | | | |
| 12.50 | 54.17 | 33.33 | 0.00 | 100 | 0.33 | (0.48) | 16.50 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

For the task ‘the appropriateness of the content for the target P3 students, not simply cutting and pasting information from the original source’, students’ performance was very poor (see Table 6.63). The mean score was 0.33 out of 4. No students got full marks. 33.33% of the students got only 1 mark. Most of their PowerPoint files had very small font size, creating difficulties for readers (see Student: 303008 as an example). 12.50% of the students created the PowerPoint files but were not able to score at all, probably due to insufficient time to complete the content.

*Table 6.63 Percentage distributions of Special school students for each score of Q5 (Integrate_information filtering) in Chinese Language PA*

| Score (%) | | | | | | Total (%) | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|---|---|
| 0.00 (attempted the question) | 0.00 (did not attempt the question) | 1.00 | 2.00 | 3.00 | 4.00 | | | | |
| 12.50 | 54.17 | 33.33 | 0.00 | 0.00 | 0.00 | 100 | 0.33 | (0.48) | 8.25 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

The “manage” dimension of Q5 carried 2 marks, with 1 mark awarded to ‘name the PowerPoint as 「買櫝還珠」 and save it in the “My Documents” folder’ (see Table 6.64a) and another 1 mark would be given to ‘use titles to manage the content of the PowerPoint’ (see Table 6.65a). Students’ performances in these two aspects were poor with the mean score percentages of 29.00% and 21.00% respectively. However, if only counting those students who attempted the task, 63.64% and 45.45% of them got full marks in these two aspects respectively, reflecting quite good performance of some students in this dimension (see Tables 6.64b & 6.65b).

*Table 6.64a Percentage distributions of Special school students for each score of Q5 (Manage_file naming and saving) in Chinese Language PA*

| **Score (%)** | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | | | | |
| 16.67 | 54.17 | 29.17 | 100 | 0.29 | (0.46) | 29.00 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

*Table 6.64b Percentage distributions of Special school students for each score of Q5 (Manage_file naming and saving) in Chinese Language PA (excluding those 'not-reached' and 'non-response' students)*

| **Score (%)** | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|
| **0.00** | **1.00** | | | | |
| 36.36 | 63.64 | 100 | 0.64 | (0.50) | 64.00 |

N=11
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

*Table 6.65a Percentage distributions of Special school students for each score of Q5 (Manage_titles) in Chinese Language PA*

| **Score (%)** | | | **Total (%)** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|
| **0.00 (attempted the question)** | **0.00 (did not attempt the question)** | **1.00** | | | | |
| 25.00 | 54.17 | 20.83 | 100 | 0.21 | (0.41) | 21.00 |

N=24
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

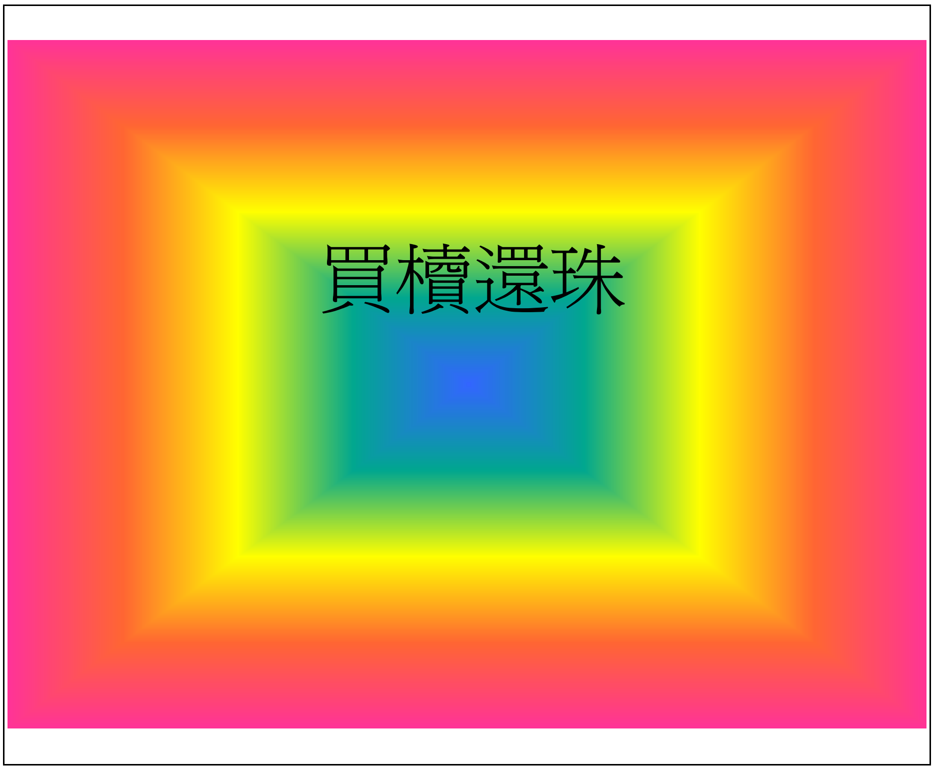
*Table 6.65b Percentage distributions of Special school students for each score of Q5 (Manage_titles) in Chinese Language PA (excluding those 'not-reached' and 'non-response' students)*

| Score (%) | | Total | Mean | (SD) | Mean Score |
|---|---|---|---|---|---|
| **0.00** | **1.00** | **(%)** | **Score** | | **Percentage (%)** |
| 54.55 | 45.45 | 100 | 0.45 | (0.52) | 45.00 |

N=11
N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.
- Figures may not sum to 100 percent because of rounding.

(Student: 303007)

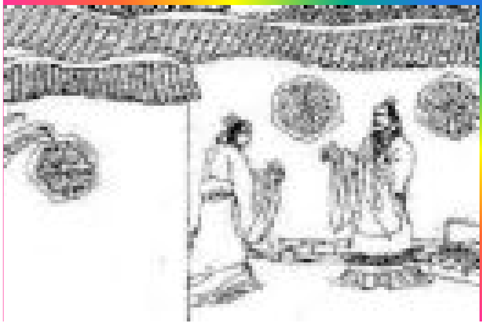
- This student adopted two special effects in the PowerPoint file, i.e. background and pictures. (Create: 2 marks)



從前有一個楚國人，他有一顆漂亮的珍珠，打算把這顆珍珠賣出去。爲了賣個好價錢，他便動腦筋要將珍珠好好包裝一下。

這個楚國人使用名貴的木料，又請來手藝精湛的工匠，爲珍珠製造了一個盒子，用香料把盒子弄得芳香撲鼻。然後在盒子的外面精雕細琢，刻了許多好看的花紋，還鑲上漂亮的花邊，看上去，閃閃生光，實在是一件美輪美奐的工藝品。楚國人將珍珠小心翼翼地放進盒子後，便拿到市場上去賣。

到了市場不久，很多人都圍上來欣賞楚人的盒子。一個鄭國人對盒子愛不釋手，出高價將楚人的盒子買下。鄭人付錢後，便拿著盒子離開了。可是沒走幾步他又回來。鄭人走到楚人跟前，將盒子裏的珍珠取出來交給楚人說：「先生，您將一顆珍珠遺留在盒子裏了，我特意回來交還的。」於是鄭人將珍珠交回了給楚人，然後低著頭一邊欣賞著木盒子，一邊離開了。



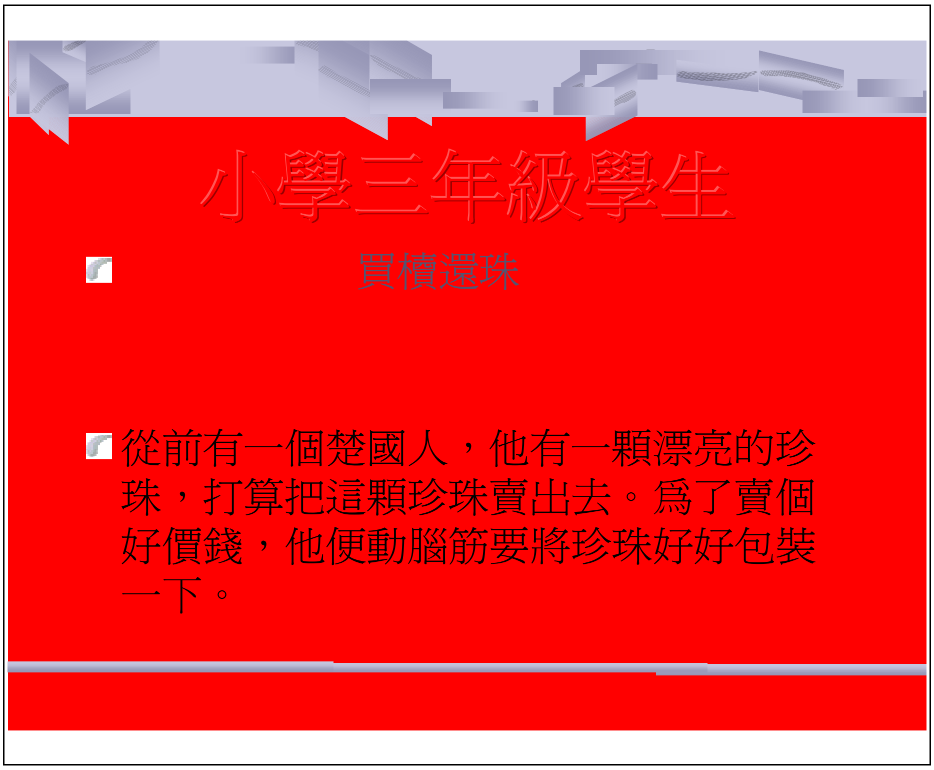
楚人拿著被退回的珍珠，一臉靦腆，十分尷尬地站在那裏。他原本以爲別人會欣賞他的珍珠，可是沒想到包裝的盒子太過精美，令人只想買走盒子，忽略了珍珠的價值。

(Student: 303008)

- The font size of this PowerPoint file was too small to read. (Integrate_information filtering: 1 mark)


(Student: 303011)

- This PowerPoint file presented the story but failed to point out its morals. (Integrate_content: 1 mark)



(Student: 302005)

- This PowerPoint file had a title but no content (Integrate_content: 0 marks)


## 6.5 Students' Performance across Schools / Levels

In the previous section, students' performances in each question were analysed. In this section, students' performance across schools will be analysed regarding the 8 IL indicators. In this study, schools' mean is used to compare the differences and boxplots are used to present the distribution of means. ANOVA was run to identify whether the differences amongst these schools are significant or not. Section 6.5.1 presents 40 primary schools' result and section 6.5.2 presents 33 secondary schools' result. As only a few special schools were involved in this study, no analysis was conducted in this respect.

### 6.5.1 Primary Schools

40 primary schools participated in this PA. Figure 6.4 shows the boxplot of students' performance in the 8 IL indicators of Chinese Language PA across primary schools. As shown in the figure, there was not much difference in the level of performance amongst schools. It was observed that smaller dispersions were found in the dimensions of "define" and "communicate" and larger dispersions were found in "access" and "integrate". Students from one school (school 112) demonstrated apparently better performance in the dimension of "evaluate".

The highest mean was 29.21 out of 50 while the lowest was 7.11 (see Table 6.66). Students best performed in "define", with the mean score percentage of 46.00% and also with the smallest dispersion. This suggested that all schools performed quite well in this IL dimension and that students from these schools had comparable level of performance. Students performed the poorest in the “access” dimension with the mean score percentage of 31.93%. The dispersion amongst schools in this dimension was also the largest. This indicated that the performance of some schools were however better in the “access” dimension though some were poorer.

ANOVA revealed that differences amongst schools in all IL dimensions as well as the “total” score were significant ($p<.05$) (see Table 6.67).

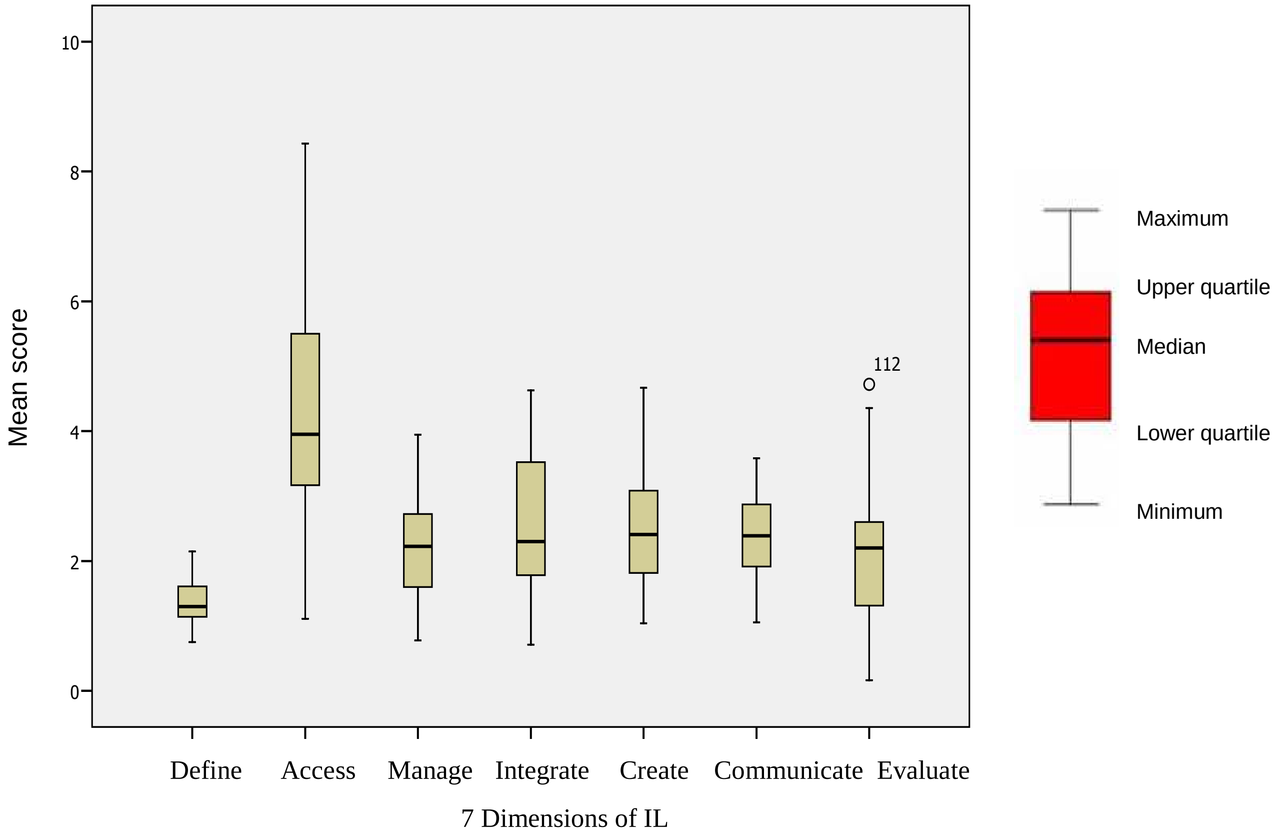



*Figure 6.4 Students’ IL performance in Chinese Language PA across primary schools*

*Table 6.66 Mean scores of 8 IL indicators in Chinese Language PA for 40 primary schools*

| IL Indicator | Min | Max | Full Score | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|
| Define | 0.75 | 2.15 | 3 | 1.38 | (0.35) | 46.00 |
| Access | 1.11 | 8.43 | 14 | 4.47 | (1.74) | 31.93 |
| Manage | 0.78 | 3.94 | 6 | 2.25 | (0.76) | 37.50 |
| Integrate | 0.71 | 4.63 | 7 | 2.59 | (1.08) | 37.00 |
| Create | 1.04 | 4.67 | 7 | 2.59 | (0.95) | 37.00 |
| Evaluate | 0.17 | 4.72 | 6 | 2.06 | (1.00) | 34.33 |
| Communicate | 1.06 | 3.58 | 7 | 2.43 | (0.55) | 34.71 |
| Total | 7.11 | 29.21 | 50 | 17.77 | (5.45) | 35.54 |

N=40
N.B. - N listed in the table is the unweighted number of schools.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are weighted statistics.

*Table 6.67 ANOVA of 8 IL indicators across Primary schools in Chinese Language PA*

| IL Indicator | df | F | Sig. |
|---|---|---|---|
| Define | 39, 785 | 2.94 | 0.00* |
| Access | 39, 785 | 4.94 | 0.00* |
| Manage | 39, 785 | 3.82 | 0.00* |
| Integrate | 39, 785 | 7.25 | 0.00* |
| Create | 39, 785 | 2.62 | 0.00* |
| Evaluate | 39, 785 | 5.30 | 0.00* |
| Communicate | 39, 785 | 4.08 | 0.00* |
| Total | 39, 785 | 7.44 | 0.00* |

N.B. - * Difference significant if Sig (p) <0.05.

### 6.5.2 Secondary Schools

33 secondary schools participated in this PA. Figure 6.5 shows the performance of students in the 8 IL indicators of schools. It was observed that smaller dispersions were found in the dimensions of "define" and "evaluate" and larger dispersions were found in the "access" and "integrate" dimensions. There was one school in each of the dimensions of "communicate" (school 203) and "evaluate" (school 223) that performed apparently better than other schools.

The highest mean was 33.14 out of 50 while the lowest was 12.20 (see Table 6.68). The mean score percentage of "evaluate" was the poorest (8.00%). The lowest mean score of schools was 0 marks out of the total of 6 while the highest was just 1.70 marks. Besides, the dispersion was relatively small. This suggested that all schools performed quite poorly in this dimension and that the difference amongst schools was relatively small.

As seen in Table 6.69, ANOVA showed that differences amongst these schools in each IL dimension as well as the “total” score were significant (p<.05).

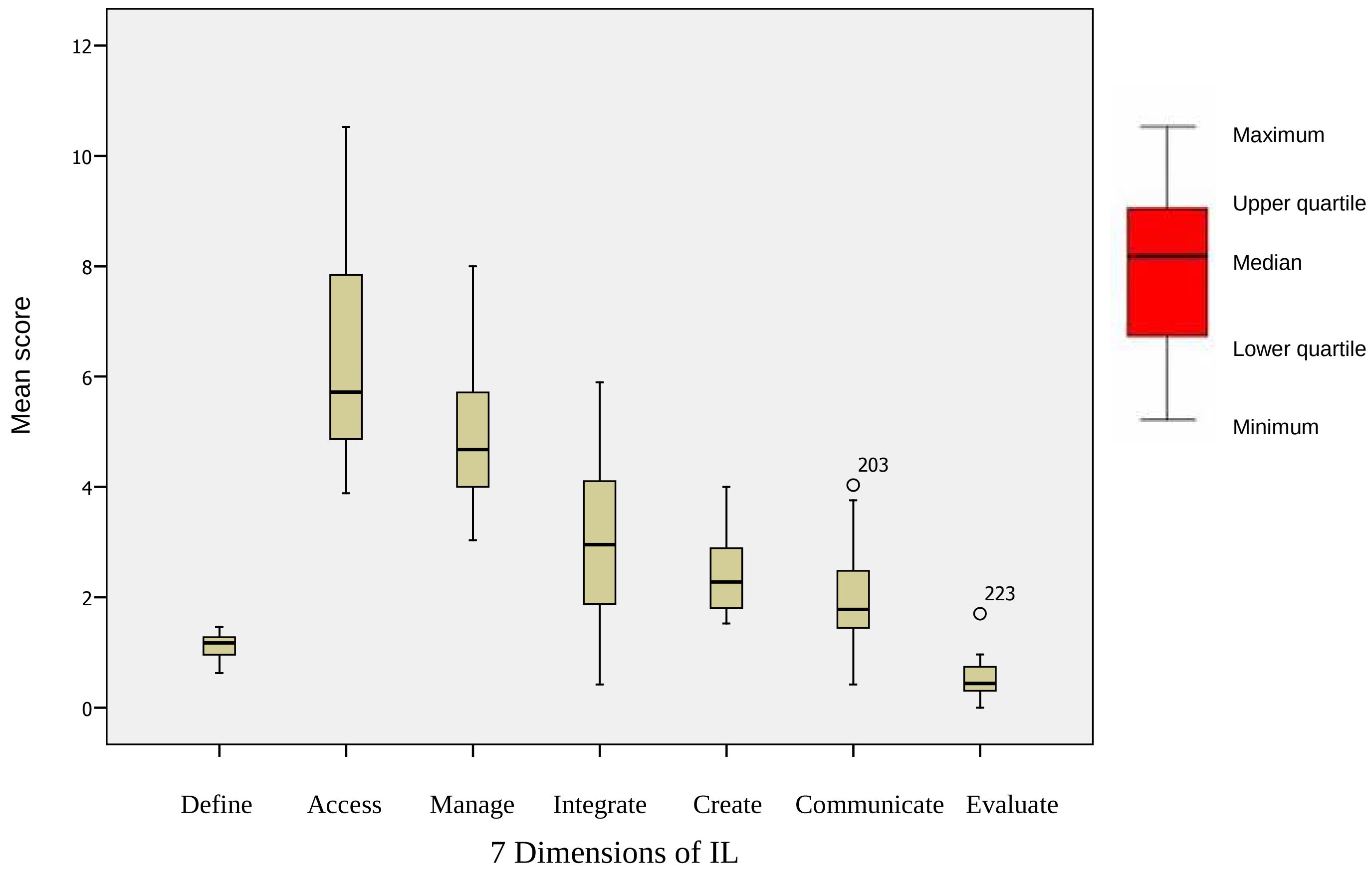



*Figure 6.5 Students' IL performance in Chinese Language PA across Secondary schools*

*Table 6.68 Mean scores of 8 IL indicators in Chinese Language PA for 33 Secondary schools*

| **IL Indicator** | **Min** | **Max** | **Full Score** | **Mean Score** | **(SD)** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|
| Define | 0.63 | 1.46 | 2 | 1.13 | (0.19) | 56.50 |
| Access | 3.88 | 10.52 | 12 | 6.83 | (1.81) | 56.92 |
| Manage | 3.04 | 8.00 | 9 | 5.51 | (1.30) | 61.22 |
| Integrate | 0.42 | 5.90 | 10 | 3.44 | (1.42) | 34.40 |
| Create | 1.53 | 4.00 | 6 | 2.69 | (0.68) | 44.83 |
| Evaluate | 0.00 | 1.70 | 6 | 0.48 | (0.36) | 8.00 |
| Communicate | 0.42 | 4.03 | 5 | 2.20 | (0.79) | 44.00 |
| Total | 12.20 | 33.14 | 50 | 22.28 | (5.73) | 44.56 |

N=33
N.B. - N listed in the table is the unweighted number of schools.
- “Mean Score”, “SD” and “Mean Score Percentage (%)” are weighted statistics.

*Table 6.69 ANOVA of 8 IL indicators across Secondary schools in Chinese Language PA*

| IL Indicator | df | F | Sig. |
|---|---|---|---|
| Define | 32, 787 | 1.65 | 0.01* |
| Access | 32, 787 | 11.53 | 0.00* |
| Manage | 32, 787 | 7.38 | 0.00* |
| Integrate | 32, 787 | 9.98 | 0.00* |
| Create | 32, 787 | 7.49 | 0.00* |
| Evaluate | 32, 787 | 6.13 | 0.00* |
| Communicate | 32, 787 | 9.01 | 0.00* |
| Total | 32, 787 | 18.14 | 0.00* |

N.B. * Difference significant if Sig (p) <0.05.

## 6.6 Comparing the Difficulty Levels of the Seven Dimensions of Information Literacy in Chinese Language Performance Assessment

This section would compare the difficulty levels of the 7 IL dimensions in Chinese Language Performance Assessment. It is worth noting that there was constraint in the design of the performance tasks in the assessment as the full score of each IL dimension was not the same. Besides, the order of the assessment questions might affect students' IL performance in completing the tasks on the whole. For instance, it was possible that students from the three types of schools, namely primary, secondary and special schools, were unable to complete all the questions due to insufficient time. In addition, as the final question asked students to create a PowerPoint file (Q4 of primary schools and Q5 of secondary schools), students' mean scores in the dimensions of the "create", "access", "manage" and "integrate" which carried more marks would be apparently affected by those "not-reached" and "non-response" students. Taking this into consideration, the following results would exclude those "not-reached" and "non-response" students. Only students who had attempted the questions would be included in the analysis, with primary schools' results being reported first, followed by that of secondary and special schools.

### 6.6.1 Primary Schools

Table 6.70 shows the performance of primary 5 students in the 7 IL dimensions of IL, of which their performances in "define", "manage" and "create" were better. The former had the mean score percentage of 47.00%, while the latter two had both mean score percentages of 42.00%, reflecting that students could master the competence in these dimensions more easily. On the other hand, the performances of "communicate" and "access" were the worst, with the mean percentages of 35.29% and 35.57% respectively. This indicated that "communicate" and "access" were the most difficult dimensions for most primary 5 students, followed by "integrate". In fact, from the performances of students, most of them could only master the requirements of "communicate", "access" and "integrate" at the "basic" level and could not reach the levels of "proficient" or "advanced".

*Table 6.70 Mean scores of Primary 5 students (excluding those "not-reached" and "non-response" students) across the 8 IL indicators of Chinese Language PA*

| IL Indicator | N | Min | Max | Mean Score | (SD) | Full Score | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| Define | 815 | 0 | 3 | 1.41 | (.94) | 3 | 47.00 |
| Access | 727 | 0 | 14 | 4.98 | (3.58) | 14 | 35.57 |
| Manage | 727 | 0 | 6 | 2.52 | (1.70) | 6 | 42.00 |
| Integrate | 794 | 0 | 7 | 2.68 | (2.02) | 7 | 38.29 |
| Create | 727 | 0 | 7 | 2.94 | (1.99) | 7 | 42.00 |
| Communicate | 801 | 0 | 7 | 2.47 | (1.56) | 7 | 35.29 |
| Evaluate | 701 | 0 | 6 | 2.44 | (2.29) | 6 | 40.67 |
| Total | 825 | 0 | 45 | 17.58 | (10.07) | 50 | 35.16 |

N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are weighted statistics.

### 6.6.2 Secondary Schools

Table 6.71 indicates the performance of secondary 2 students in the 7 IL dimensions, of which their performances in "manage" and "define" were better, with the mean percentages of 60.78% and 58.50% respectively, reflecting that students could master the competence in these dimensions more easily. On the other hand, students' performance in "integrate" and "evaluate" were the worst, with the mean percentages of 32.80% and 37.00% respectively. This indicated that "integrate" and "evaluate" were the most difficult dimensions for the secondary 2 students. In fact, "integrate" and "evaluate" dimensions required higher-order thinking skills of students. Their performance implied that most students could only master the requirements of "integrate" and "evaluate" at the "basic" level and could not reach the "proficient" or "advanced" levels.

*Table 6.71 Mean scores of Secondary 2 students (excluding those "not-reached" and "non-response" students) across the 8 IL indicators of Chinese Language PA*

| IL Indicator | N | Min | Max | Mean Score | (SD) | Full Score | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| Define | 794 | 0 | 2 | 1.17 | (.75) | 2 | 58.50 |
| Access | 820 | 0 | 12 | 6.33 | (3.26) | 12 | 52.75 |
| Manage | 790 | 0 | 9 | 5.47 | (2.52) | 9 | 60.78 |
| Integrate | 767 | 0 | 9 | 3.28 | (2.51) | 10 | 32.80 |
| Create | 790 | 0 | 6 | 2.69 | (1.30) | 6 | 44.83 |
| Communicate | 777 | 0 | 5 | 2.14 | (1.38) | 5 | 42.80 |
| Evaluate | 799 | 0 | 6 | 2.22 | (1.72) | 6 | 37.00 |
| Total | 820 | 0 | 40 | 20.26 | (8.87) | 50 | 40.52 |

N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are weighted statistics.

### 6.6.3 Special Schools

Table 6.72 shows the performance of secondary 2 students in special schools on the 7 IL dimensions. Similar to the findings of secondary schools, students performed better in "manage" and "define", with the mean percentages of 46.11% and 38.50% respectively, reflecting that could master the competence in these dimensions more easily. On the other hand, students' performance in "evaluate" and "integrate" were the worst, with the mean percentages of 9.83% and 18.50% respectively. This indicated that "evaluate" and "integrate" were the most difficult for the special schools' students. In fact, both "integrate" and "evaluate" dimensions required higher-order thinking skills of the students. Their performance implied that most students could only master the requirements of "integrate" and "evaluate" at the "basic" level and could not reach the "proficient" or "advanced" levels.

*Table 6.72 Mean scores of Special School students (excluding those "not-reached" and "non-response" students) across the 8 IL indicators of Chinese Language PA*

| IL Indicator | N | Min | Max | Mean Score | (SD) | Full Score | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| Define | 22 | 0 | 2 | 0.77 | (.87) | 2 | 38.50 |
| Access | 24 | 0 | 11 | 3.75 | (3.18) | 12 | 31.25 |
| Manage | 20 | 0 | 9 | 4.15 | (2.60) | 9 | 46.11 |
| Integrate | 20 | 0 | 5 | 1.85 | (1.73) | 10 | 18.50 |
| Create | 20 | 0 | 4 | 1.85 | (1.09) | 6 | 30.83 |
| Communicate | 20 | 0 | 4 | 1.60 | (1.10) | 5 | 32.00 |
| Evaluate | 22 | 0 | 6 | 0.59 | (1.47) | 6 | 9.83 |
| Total | 24 | 0 | 31 | 11.54 | (8.57) | 50 | 23.08 |

N.B. - N listed in the table is the number of students.
- All data above are unweighted statistics.

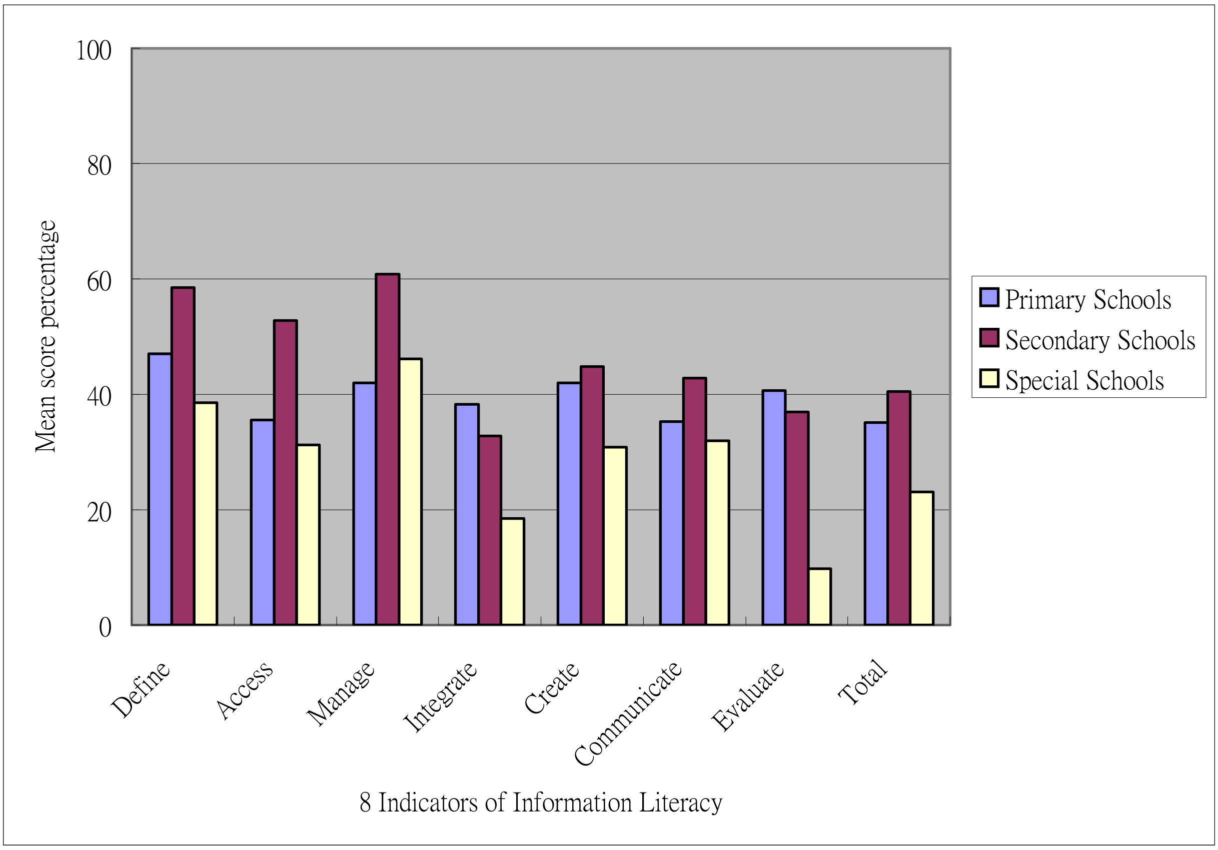



*Figure 6.6 Mean score percentages of Primary, Secondary and Special schools students (excluding those "not-reached" and "non-response" students) in the 8 IL indicators of Chinese Language PA*

## 6.7 Summary

In conclusion, chapter 6 includes six sections, summarizing students' performance in the Chinese Language PA. The research findings can be summarized as the following points:

### 6.7.1 Students' Information Literacy Competences in Chinese Language Performance Assessment

Section 6.3 analyzed students' performance according to the 8 IL indicators in Chinese Language PA. The findings showed that primary schools' students had better performances in "define" and "create" and the worst in "access", followed by "communicate" and "evaluate". Secondary and special schools' students had better performances in "manage" and "define" while the performance in "integrate" and "evaluate" were the worst. Though the analysis in Section 6.6 only included those who had attempted the questions, the findings were very similar to that of Section 6.3. As for primary schools, students performed the best in "define", followed by "manage" and "create". The worst performance was in "communicate", followed by "access" and "integrate". The performance of secondary and special schools' students was similar to that in Section 6.3. Their performances in “manage” and “define” were better while those in “integrate” and “evaluate” were worse. The above results showed the competences of primary, secondary and special schools students in different IL dimensions were different. Generally speaking, students from all three groups performed better in “define”, but weaker in “evaluate” than in other IL dimensions. In addition, the IL competence differed significantly among primary schools as well as secondary schools. Some IL dimensions, such as “access” and “integrate”, had greater differences, which implied that the performance of students among schools was varied.

### 6.7.2 Management of Internet Materials

Students from all three groups, namely primary, secondary and special schools, performed better in “define” than in other IL dimensions. Most of them could use the appropriate keywords to search for information and materials in the Internet. This showed that they had the experience of searching for materials in the Internet and their skills were quite proficient. However, for “integrate” and “evaluate”, which required the ability to further process information, the performance of the students was not satisfactory. From students’ works like “email writing” and “PowerPoint creation”, students were able to demonstrate their competence in “define” by searching for related materials from the Internet, but they only used the materials for direct pasting purpose, instead of selecting or organizing them. As a result, irrelevant or wrong information was included in their answers. For instance, most of the students did not organize the materials obtained and pasted the information directly into the email in “email writing” of Q2 in primary schools and Q4 in secondary schools. Thus, many marks were deducted in “integrate”. As for “evaluate”, quite a number of students were not able to judge if the materials obtained from the Internet were appropriate and useful. Primary schools’ students were also unable to determine and correct the mistakes in the assessment task with the help of the Internet materials. Secondary and special schools’ students tended to neglect the requirement of the questions. They were unable to give explanation to the meaning of the word「釋」, but merely copied and pasted the whole paragraph of information from the Internet without considering the relevance of the information. These examples indicated that most students only attained basic or novice level of competence in managing materials from the Internet. Students had the ability to access and search for information, but they lacked judgment, selection and organization skills when using it.

### 6.7.3 On-line Communication Skills

Students, either from primary, secondary or special schools, demonstrated a rather weak performance in “communicate” dimension. Most students could fill in the recipient and subject of the mail correctly, indicated that they had mastered the basic skills of sending emails. However, they commonly had weak language consciousness in the content of their emails. Most of their emails missed out the salutation and complimentary close and did not reveal the names and identities of the recipients and themselves. They also neglected the requirement of the questions. The content of their emails only had the necessary information, but did not ask for teachers' comments. In addition, the emails on the whole were unable to exhibit the students' intention to communicate with others, which reflected that they only reached the "basic" level in "communicate". They knew the methods of sending emails, but had not acquired the skills to communicate with others through emails. Their performance, to a certain extent, reflected their habit of using emails. To them, emails seemed to be merely a means to transmit information, but not a tool for communication.

### 6.7.4 Application of Software

In the Chinese Language PAs of primary 5 and secondary 2, there were two questions which required students to use software to complete the tasks. The results showed that the completion rates for primary, secondary as well as special schools in these two questions were relatively low. The lowest completion rate was found in the last question, which was about PowerPoint creation, followed by the first question, asking students to "create a table and categorize the information". Apart from the possibility of insufficient time, such results might be due to the fact that the students were unfamiliar with the operation of software such as "Word", "Excel" and "PowerPoint", making them unable to answer the questions, particularly in Q1.1 of primary 5 and Q1 in special schools, in which almost 25% (24.61%) and about 30% (29.17%) of the students did not attempt the questions respectively. Though the completion rates were rather low, it was observed that those who attempted the questions, either in primary, secondary or special schools, were quite familiar with the use of the software. They had satisfactory to very good performance in "manage" and "create", as in "save and name the file correctly" and "create table and categorize information" (see Appendix 6.4). Quite a number of students were also able to give appropriate titles to the tables and PowerPoint file. Though the PowerPoint files created by the students were simple, they could apply some "create" skills to a certain extent, such as the change of font style, background and color, as well as inserting pictures to beautify the PowerPoint file. The above results indicated that despite the fact that some primary and special school students were inexperienced in using the software; however, from the works of those who had attempted the question, many of them reached the proficient level in using software. Therefore, their performance in "manage" and "create" were satisfactory.

## 6.8 Recommendations

### 6.8.1 Designing Descriptors to Indicate Levels of Information Literacy across Chinese Language Curriculum

The research findings showed that students of primary, secondary and special schools had different levels of IL competence in the 7 dimensions. Similarly, the results among the primary schools as well as secondary schools differed. Students had achieved the proficient level in certain IL dimensions such as "define", but they commonly had achieved only basic level in some of the dimensions like "communicate" and "evaluate". Due to the fact that the recent

Chinese Language Curriculum does not specify the expected achievements in the 7 IL dimensions, schools or teachers do not have a clear concept about what levels of IL competences the students should master. It is suggested that an IL framework for Chinese Language Curriculum should be designed, illustrating the expected levels of IL competences that students should have attained in different learning key stages. This can allow schools and teachers to have precise guidelines and narrow the differences among schools, making every student learn Chinese Language through the assistance of Information Technology.

### 6.8.2 Enhancing Students' Ability to Manage Information

The above discussion mentioned that students had familiar skills in searching for information in the Internet, but their competence in manage was rather weak. This could be related to students' attitude and ability. As for attitude, schools and teachers should remind students that the materials obtained from the Internet may not be all correct. They should judge and select materials carefully rather than paste directly and recklessly, in order to cultivate their habit of treating Internet materials seriously. As for ability, students may not have experiences in managing materials, making them to perform less well in dimensions like "evaluate" and "integrate", which require higher-order thinking skills. Schools and teachers could design some assignments or tasks such as "Project-based learning" and "PowerPoint Project" in order to help students learn how to mange different materials.

### 6.8.3 Enhancing Students' Language Consciousness

The findings showed that a lot of students knew the methods of sending emails, but most of them had not mastered communication skills in using emails, neglecting the communication function of email. Therefore, students missed out the salutation and complimentary close as well as the intention to communicate. Schools and teachers should correct this kind of bad writing habit of emails and let them know that there are no great differences between emails and letters. There are basic formats and that the writer should be aware of his or her register and attitude. Teachers can provide students with some contextual tasks in order to foster their language consciousness.

# Chapter 7 Findings on Mathematics Performance Assessment

This chapter reports findings on Mathematics Performance Assessment (PA) for 844 primary 5 students in local primary schools. In general, according to invigilators' reports and interviews with individual students, quite a number of the students considered the assessment not directly associated with their school learning. However, some students expressed eagerly their concern about scores that they might obtain. Students' different attitude towards the assessment may affect their performance.

The first section below is a description of the assessment tasks, followed by the second section about the task completion rates. The third section concisely introduces students' overall performance in information literacy (IL) of Mathematics PA. The fourth section is a discussion about students' performance at item level. The fifth section is about student's performance across the primary schools, and the sixth one is about the comparison of the difficulty levels of the 7 IL dimensions in Mathematics PA. The last two parts are the summary, which highlights task completion rates, performance in key tasks, and performance in individual IL dimension, and a brief discussion on recommendations.

## 7.1 Description of the Assessment Tasks

The assessment tasks were designed to assess primary school students' IL competences in Mathematics PA (Table 7.1). In each task, there were specific IL dimensions to be assessed, for example, in Q1, the dimensions of "define", "access" and "integrate" were relevant. For each question, there might be two or more sub-questions designed for one specific IL dimension. For some dimensions, such as "access" and "integrate", there were more questions set for the same dimension. Moreover, to have a better understanding of students' competences, there were four levels of competence defined: "advanced", "proficient", "basic" and "novice" for a number of tasks. In order to attract students' interest and attention, the tasks were related to students' daily life experience. It was believed that many participants might have some experience in visiting the Hong Kong Ocean Park; hence, the scenario was focused on a family visit to the Park.

*Table 7.1 Task description and IL dimensions of Mathematics PA*

| Brief Description of the Questions | | IL Dimension(s) | Highest Competence Level Attained | Score |
|---|---|---|---|---|
| Q1. Use of search engine to get ticket information of Hong Kong Ocean Park | | | | |
| 1.1 | Search with “Hong Kong Ocean Park” | Define | Advanced | 3 |
| 1.2 | Differentiate appropriateness of search engines | Access | Proficient | 2 |
| 1.3 | Get relevant website for Hong Kong Ocean Park | Access | Basic | 1 |
| 1.4 | Retrieve correct fares for adults and children | Access | Advanced | 3 |
| 1.4 | Calculate accurately each family member’s ticket fare | Integrate | Advanced | 3 |
| Q2. Use the software to draw a Christmas-tree shape | | | | |
| 2 | Design the shape with interactive software | Create | Basic | 2 |
| 2 | Calculate perimeter of the shape with relevant information | Integrate | Advanced | 3 |
| 2 | Save the graphic file of the shape | Manage | Basic | 1 |
| Q3. Operate the software to observe changes in dimensions of a rectangle | | | | |
| 3.1 | Record 3 rectangles with various dimensions | Create | Basic | 6 |
| 3.2 | Deduce relational changes in length and width between changes in dimensions | Integrate | Advanced | 3 |
| 3.3 | Get length and width of the biggest area dimension | Integrate | Basic | 2 |
| Q4. Classify a number of shapes into appropriate categories | | Manage | Proficient | 4 |
| Q5. Re-organisation of information of two given graphics | | | | |
| 5 | Explain the rationale of re-organisation | Manage | Advanced | 3 |
| 5 | Save files | Manage | Basic | 1 |
| 5 | Send email to subject teacher | Communicate | Advanced | 3 |
| Q6. Retrieval of appropriate fare data of two bus routes from websites | | | | |
| 6.1 | Appropriate information from website | Access | Advanced | 3 |
| 6.2 | Calculate bus fares | Integrate | Advanced | 3 |
| 6.2 | Compare bus fares and make right judgment | Evaluate | Basic | 4 |

## 7.2 Task Completion

Figure 7.1 shows the percentage of task completion. On average, about 70% of the students successfully completed questions 1 to 5. Among these questions, the first two received over 94% of the attempts. However, there was a drop to less than 43% of the students who had tried Q6. It might be due to unbalanced time allocation as reflected in the number of students who did not reach or did not respond to the question, which increased greatly from Q4. There might be two possible reasons for the low percentage of task completion. Firstly, in face-to-face interviews immediately after the assessment, some students expressed that the assessment results would not be reckoned as a formal record of their academic performance. Therefore, they might not have taken the PA tasks seriously.

Secondly, some students were not familiar with the built-in software required for completing the tasks of Q2 to Q4 (For details, please refer to Appendix 7.1.).

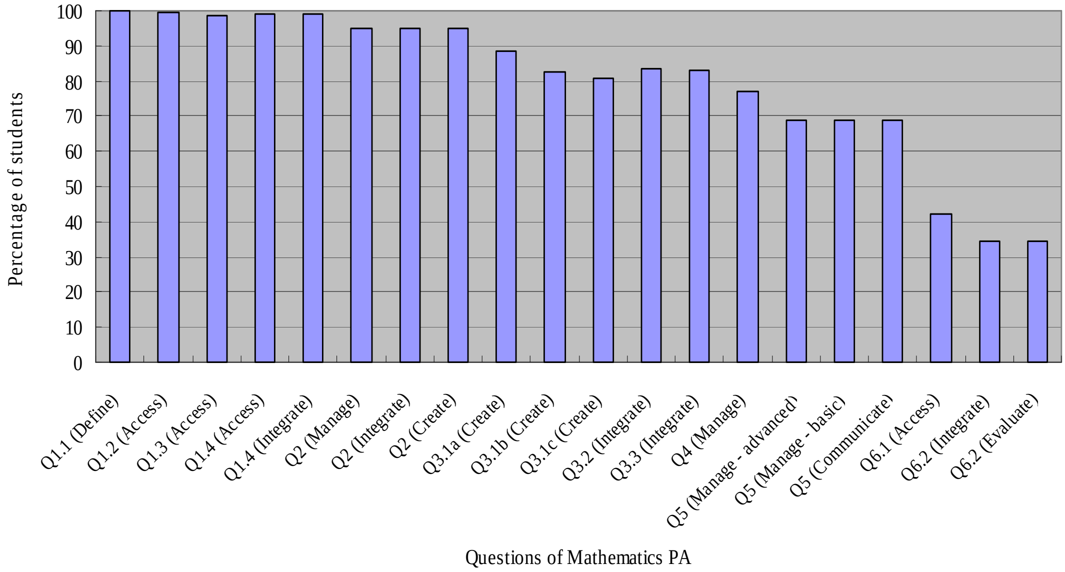



*Figure 7.1 Percentages of primary school students in completing the tasks of Mathematics PA*

## 7.3 Students' Overall Performance in Information Literacy of Mathematics Performance Assessment

When examining students' overall performance in IL of Mathematics PA, the mean score percentage of each dimension using weighted data was presented (Table 7.2). Among the 7 IL dimensions, students showed better performance in "define", "access" and "create" with the respective mean score percentages as 58.67%, 45.56% and 51.37%. Their respective lower mean score percentages in "integrate", "communicate", and "evaluate" were 16.21%, 25.33% and 4.00%.

Some students exhibited their outstanding performances in the dimensions of "define", "access", "manage", "create", "communicate" and "evaluate", i.e. maximum = full score. However, among the 7 IL dimensions, the largest standard deviation was found in the "create" dimension (2.93). In the dimensions of "communicate" and "evaluate", the respective standard deviations appeared to be smaller (0.97 and 0.63). The maximum "total" score for students in primary schools was 38 out of 50. The total mean score was 16.38 (SD=7.95).

*Table 7.2 Mean scores of primary school students in 8 IL indicators of Mathematics PA*

| IL Indicator | Minimum (Min) | Maximum (Max) | Mean Score (a) | (SD) | Full Score (b) | Mean Score Percentage (%) (a)/(b)X100% |
|---|---|---|---|---|---|---|
| Define | 0 | 3 | 1.76 | (1.04) | 3 | 58.67 |
| Access | 0 | 9 | 4.10 | (2.20) | 9 | 45.56 |
| Manage | 0 | 9 | 3.22 | (2.29) | 9 | 35.78 |
| Integrate | 0 | 11 | 2.27 | (1.94) | 14 | 16.21 |
| Create | 0 | 8 | 4.11 | (2.93) | 8 | 51.37 |
| Communicate | 0 | 3 | 0.76 | (0.97) | 3 | 25.33 |
| Evaluate | 0 | 4 | 0.16 | (0.63) | 4 | 4.00 |
| Total | 0 | 38 | 16.38 | (7.95) | 50 | 32.76 |

N=844

N.B. - N listed in the table is the unweighted number of students.
- “Mean Score”, “SD” and “Mean Score Percentage (%)” are weighted statistics.

Poor performance in “evaluate” was likely related to time management factor because Q6 (Evaluate) was the last part of the assessment. For the dimensions of “integrate” and “communicate”, time management factor might not explain their weaker performance**.** Except that of Q6.2 (Integrate), the task completion percentages for the questions assessing “integrate” and “communicate” were high, ranging from 68.95% to 99.05% (Appendix 7.1). Since students were expected to attain advanced level in these two dimensions, except in Q3.3 (Integrate – basic), the unsatisfactory performances may be resulted from their weaker higher-order thinking skills such as reasoning, generalizing and interpreting data. Students demonstrated a varied level of performance in different questions under the same dimension in “manage” and “create”. In the next section, their performance at item level will be investigated to help elaborate such mixed performance.

## 7.4 Students’ Performance at Item Level

This section contains an overview and students’ responses for each item with samples of students’ answers to specific questions.

### 7.4.1 An overview

This section illustrates what students knew and were able to do with reference to the representative work in Mathematics PA. Firstly, the primary school students’ mean score for each Mathematics PA item is presented (Table 7.3). Secondly, their levels of achievement were reported by making reference to their works and the observations of invigilators during the PA.

Table 7.3 shows the weighted mean score and mean score percentage of each question for all the primary school students. Q1.1, Q1.2, and Q3.1a had the best results with mean score percentages of

58.67%, 80.00%, and 60.00% respectively. Other better performances were found in Q1.3, Q1.4, Q3.1b, Q3.1c, and Q4 of which the mean score percentages were 57.00%, 55.67%, 54.00%, 52.00%, and 52.75% respectively. The results in Q2 (Manage), Q2 (Integrate), Q3.2 (Integrate), Q3.3 (Integrate), Q5 (Manage-advanced) and Q6.2 (Integrate) reflected students' poor performance in the dimensions of "manage" and "integrate". Their respective mean score percentages were 29.00%, 15.67%, 14.00%, 6.50%, 12.00% and 4.00%**.** Other poor results fell on Q6.1 (Access) and Q6.2 (Evaluate) with mean score percentages of 8.33% and 4.00% respectively.

The standard deviations (SD) ranging from 0.42 to 1.59 reflected that there was not a very large dispersion of individual performance of all students in most of the items. For example, no big differences were noted in students' performances in Q2 (Manage), Q2 (Integrate), Q3.2 (Integrate), Q3.3 (Integrate), Q5 (Manage-advanced), Q6.2 (Integrate), and Q6.2 (Evaluate) with SD of 0.45, 0.65, 0.62, 0.48, 0.64, 0.42, and 0.63 respectively. Comparatively larger gaps in students' performances were found in Q1.4 (Access), Q1.4 (Integrate) and Q4 (Manage) with SD of 1.40, 1.21 and 1.59 respectively.

*Table 7.3 Primary school students' mean score of each Mathematics PA item*

| **Question No.** | **IL Dimension** | **Min** | **Max** | **Mean Score** | **(SD)** | **Full Score** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|
| Q1.1 | Define | 0.00 | 3.00 | 1.76 | (1.04) | 3 | 58.67 |
| Q1.2 | Access | 0.00 | 2.00 | 1.60 | (0.78) | 2 | 80.00 |
| Q1.3 | Access | 0.00 | 1.00 | 0.57 | (0.49) | 1 | 57.00 |
| Q1.4 | Access | 0.00 | 3.00 | 1.67 | (1.40) | 3 | 55.67 |
| Q1.4 | Integrate | 0.00 | 3.00 | 1.13 | (1.21) | 3 | 37.67 |
| Q2 | Manage | 0.00 | 1.00 | 0.29 | (0.45) | 1 | 29.00 |
| Q2 | Integrate | 0.00 | 3.00 | 0.47 | (0.65) | 3 | 15.67 |
| Q2 | Create | 0.00 | 2.00 | 0.79 | (0.98) | 2 | 39.50 |
| Q3.1a | Create | 0.00 | 2.00 | 1.20 | (0.96) | 2 | 60.00 |
| Q3.1b | Create | 0.00 | 2.00 | 1.08 | (0.97) | 2 | 54.00 |
| Q3.1c | Create | 0.00 | 2.00 | 1.04 | (0.97) | 2 | 52.00 |
| Q3.2 | Integrate | 0.00 | 3.00 | 0.42 | (0.62) | 3 | 14.00 |
| Q3.3 | Integrate | 0.00 | 2.00 | 0.13 | (0.48) | 2 | 6.50 |
| Q4 | Manage | 0.00 | 4.00 | 2.11 | (1.59) | 4 | 52.75 |
| Q5 | Manage – advanced | 0.00 | 3.00 | 0.36 | (0.64) | 3 | 12.00 |
| Q5 | Manage – basic | 0.00 | 1.00 | 0.46 | (0.50) | 1 | 46.00 |
| Q5 | Communicate | 0.00 | 3.00 | 0.77 | (0.96) | 3 | 25.67 |
| Q6.1 | Access | 0.00 | 3.00 | 0.25 | (0.70) | 3 | 8.33 |
| Q6.2 | Integrate | 0.00 | 3.00 | 0.12 | (0.42) | 3 | 4.00 |
| Q6.2 | Evaluate | 0.00 | 4.00 | 0.16 | (0.63) | 4 | 4.00 |

N=844

N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are weighted statistics.

In Table 7.2, the general performance in “access”, “manage”, and “create” were satisfactory, while that in “integrate” was far below average. In fact, according to Table 7.3, the range of mean score percentages in individual questions assessing “integrate” was from 4.00% [Q6.2 (Integrate)] to 37.67% [Q1.4 (Integrate)]. It is also interesting to note that the mean score percentage (14.00%) in Q3.2 (Integrate – advanced) was higher than that (6.5%) in Q3.3 (Integrate – basic). These data seemed to reflect some factors were affecting the varied performance in “integrate”. Time management factor can explain the poor performance in Q6.2 (Integrate). As indicated in section 7.3, weak higher-order thinking skills could also be a possible reason for the relatively weaker performance in questions assessing such dimension as “integrate”.

However, limited exposure to online assessments may also be one of the causes. This may explain why a very small amount of students could get the answer which asked about calculating the biggest area in Q3.3 (Integrate – basic). A much larger number of students got 1 mark, i.e., the basic level in Q3.2 (Integrate – advanced), although there were satisfactory performance in Q3.1 a-c (Create). Relevant statistics on Q3 are provided in section 7.4.2.3.

Furthermore, Table 7.3 shows a varied performance in “access”, “manage”, and “create”. From Table 7.2, the overall mean score percentage in “access” was lower when compared with “create”. The unexpectedly low mean score percentage (8.33%) in Q6.1 (Access) was likely the source of this lower general performance in the dimension of “access”. Also, a comparatively lower mean score percentage (39.50%) was found in Q2 (Create). On the other hand, it was also interesting to note the declining performance in mean score percentages (Table 7.3) and task completion rate (Appendix 7.1) from Q3.1a (Create) to Q.3.1c (Create), which required students to complete same simple tasks with the same built-in software. Thus, the outcomes might not reflect sufficiently and necessarily students’ actual ability in the dimension of “create”.

Moreover, the differences in the mean score percentages in Q4 (Manage) (52.75%), Q5 (Manage–basic) (46.00%), Q2 (Manage) (29.00%), and Q5 (Manage–advanced) (12.00%) also reflected students’ inconsistent performance in “manage”. Nevertheless, weak performance in saving files in Q2 (Manage) was likely related with relatively weaker performance in Q2 (Create). Section 7.4.2.2 below shows that 60.37% of students got no mark in Q2 (Create) and 70.82% in Q2 (Manage). On one hand, the data reflected some of the students had not saved their files because they could not produce the shape required in Q2 (Create). On the other hand, at least 10.45% (i.e., 70.82% – 60.37%) of the students overlooked the requirement of the question and forgot to save their files. In this sense, the weak performance in Q2 (Manage) was not necessarily related to higher-order thinking skills, but might be due to the relatively lower mean score percentage in Q2 (Create).

The above discussion may explain the difficulties that students encountered. In section 7.6, which is about the difficulty levels of the seven IL dimensions in Mathematics PA, there will be a brief conclusion on the factors affecting students' performance in this assessment.

### 7.4.2 Students' responses for each item

#### *7.4.2.1 Question 1*

There were 5 tasks in this question. Students were expected to attain the advanced level for the first task, "define", for Q1.1 in which they should use appropriate keywords for information search. The score distribution (Table 7.4) of which 2.56% of the students got 1 mark, 52.08% got 2 marks, and 23.20% of them got 3 marks showed that over half of them attained the proficient level in using appropriate keywords to identify and represent information needed.

*Table 7.4 Percentage distribution of primary school students for each score of Q1.1 (Define) of Mathematics PA*

| **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | 3.00 | | | |
| 22.16 | 2.56 | 52.08 | 23.20 | 100.00 | 1.76 | (1.04) |

N=844

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Samples of students' work for Q1.1 (Define) of Mathematics PA

| | |
|---|---|
| Novice level (0 mark)<br>• Cannot identify what information is needed | • 手寫扳 (Student: 101034) |
| Basic level (1 mark)<br>• The search item is too general | • 海洋公園一日遊全部家庭成員購買普通一天入場門票的總金額 (Student: 104003) |
| Proficient level (2 marks)<br>• The search item is on topic but too general or specific | • 海洋公園,海洋公園入場費, Ocean park (Student: 122031)<br>• 南區海洋公園 (Student: 137035)<br>• 海洋公園(Student: 140032) |
| Advanced level (3 marks)<br>• The search items are focused and specific | •香港海洋公園入場門票的價錢 (Student: 112002) |

Q1.2, Q1.3, and Q1.4 (Access) were to assess students' "access" skills. Results indicated that about 80% of the students got 2 marks in Q1.2 and were proficient in identifying appropriate search engine (Table 7.5). About 60% of students got 1 mark in Q1.3. These students had acquired the basic skills in retrieving relevant website (Table 7.6). Around 50% of the students got 3 marks in Q1.4 (Access) and were able to "access" pertinent information from the website (Table 7.7). One student (140032) was able to complete the tasks satisfactorily and provided another link (http://www.y28freetogo.com/Y28free/template/fair_event.php?lang=%20-%2033k) apart from the most widely used search engine and the official Hong Kong Ocean Park website. However, students' performance was relatively weaker in the dimension that they were required to integrate necessary data [Q1.4 (Integrate)]. Only 22.09% of them attained the advanced level, 13.60% attained the proficient level, and 19.26% reached the basic level (Table 7.8). In other words, less than 40% of the students showed acceptable performance (proficient or advanced level).

*Table 7.5 Percentage distribution of primary school students for each score of Q1.2 (Access) of Mathematics PA*

| **Score (%)** | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | | | |
| 18.07 | 3.76 | 78.17 | 100.00 | 1.60 | (0.78) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

*Table 7.6 Percentage distribution of primary school students for each score of Q1.3 (Access) of Mathematics PA*

| **Score (%)** | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|
| 0.00 | 1.00 | | | |
| 42.62 | 57.38 | 100.00 | 0.57 | (0.49) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

*Table 7.7 Percentage distribution of primary school students for each score of Q1.4 (Access) of Mathematics PA*

| **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | 3.00 | | | |
| 36.84 | 8.74 | 4.82 | 49.60 | 100.00 | 1.67 | (1.40) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

*Table 7.8 Percentage distribution of primary school students for each score of Q1.4 (Integrate) of Mathematics PA*

| **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | 3.00 | | | |
| 45.06 | 19.26 | 13.60 | 22.09 | 100.00 | 1.13 | (1.21) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Samples of students' work for Q1.2 of (Access) Mathematics PA

| | |
|---|---|
| Novice level (0 mark)<br>• Cannot differentiate appropriate search engine | • 上海陽 (Student: 101003). [No link provided] |
| Basic level (1 mark)<br>• Search with appropriate search engine as well as improper search engine | • MSN (Student: 127004)<br>• 雅虎互聯網(Student: 124010) |
| Proficient level (2 marks)<br>• Use appropriate search engine to get relevant information | • 雅虎香港 (Student: 141002), http://hk.yahoo.com/<br>• Google (Student: 112004), http://www.google.com.hk/ |

Samples of students' work for Q1.3 (Access) of Mathematics PA

| | |
|---|---|
| Novice level (0 mark)<br>• Unable to locate the website where ticket price of Ocean Park can be found | • 中銀旅遊有限公司 海洋公園門劵83折原價: 成人: $185 小童: $93 優惠價: 成人: $153 小童: $77.5 （門票費用已包括『威威至激之旅』入場劵） 而且仲可以簽賬結帳。 參考資料: http://www.boct.com/tw/hot05.shtml (Student: 113032)<br>• mike.mocasting.com/p/18813-29k - 網頁紀錄 - 更多此站結果 (Student: 121024) |
| Basic level (1 mark)<br>• Able to locate the website where ticket price of Ocean Park can be found | • http://hk.knowledge.yahoo.com/question/?qid=7006092502923 (Student: 102004)<br>• http://www.oceanpark.com.hk/chi_s/main/index.html (Student: 120024) |

Samples of students' work for Q1.4 (Access) of Mathematics PA

| | |
|---|---|
| Novice level (0 mark)<br>• Use search engine to access irrelevant content | • 290×5+210=1660 (Student: 119015)<br>• 計算機 (Student: 102025) |
| Basic level (1 mark)<br>• Use search engine to access inadequate information | • 約翰,父親和母親的入場門票: $428 爺爺和嫲嫲的入場門票: $240 瑪麗的入場門票: $350 (Student: 140033) |
| Proficient level (2 marks)<br>• Use search engine to access relevant information | • (185x5)+38 =963(元) 答:約翰全家人一天的普通入場門票的總金額是 963 元(Student: 142011) |
| Advanced level (3 marks)<br>• Use search engine to access relevant and correct information | • 約翰全家人一天的普通入場門票的總金額是: 185X3+93 =555+93 =648 (Student: 139029)<br>• 原價: 成人: $185 小童: $93 185x4=740 93x2=186 全家人入場門票的總金額是:185x4=740 93x2=186=926 (Student: 116002)<br>• 總金額是: 185x3+93=555+93=648(元) (Student: 106007)<br>• 185+93+185+185 = 926+185+185 = 1111+185 = 1296 (Student: 133001) |

Samples of students' work for Q1.4 (Integrate – advanced) of Mathematics PA

| | |
|---|---|
| Novice level (0 mark)<br>• Cannot understand and integrate the information | • 290×5+210=1660 (Student: 119015)<br>• 計算機 (Student: 102025) |
| Basic level (1 mark)<br>• Inaccurate data integration | • 入場門票的總金額是:（95×2）+（185×4）＝190＋740 ＝930（元）(Student: 103026)<br>• 原價: 成人: $185 小童: $93 185x4=740 93x2=186 全家人入場門票的總金額是:185x4=740 93x2=186 =926 (Student: 116002)<br>• 185+93+185+185 = 926+185+185 = 1111+185 = 1296 (Student: 133001) |
| Proficient level (2 marks)<br>• Accurate data integration | • 成人：$185 小童(3-11)：$93 六十五歲或以上本港居民：免費 總金額：648 (Student: 103002) |
| Advanced level (3 marks)<br>• Accurate data integration and clear explanation | • 約翰全家人一天的普通入場門票的總金額是: 185x3+93 =555+93 =648(元) (Student: 119002)<br>• 總金額是: 185x3+93=555+93=648(元) (Student: 106007) |

We observed some common errors in students' performances, for example, some students preferred using too generic keywords or long keywords to search. A number of them missed an essential part, e.g., Hong Kong, in the search words, while some of them retrieved incorrect or outdated information. In the calculation task, some students showed the wrong steps or produced calculation mistakes.

#### *7.4.2.2 Question 2*

Students were required to design an earring in Christmas tree shape with built-in software, to calculate its parameters, and to save the completed file. The tasks involved assessments on the dimensions of "create", "integrate", and "manage". High percentages of the students (60.37% in "create", 59.58% in "integrate" and 70.82% in "manage" in Tables 7.9 – 7.11 respectively) got no mark in all the three dimensions. These results revealed that the students were weak in these dimensions. Around 40% of the students were able to "create" the shape with the built-in software and to attain the expected basic level (Table 7.9). About 37% of them acquired the basic "integrate" skills and successfully got correct answers with relevant data (Table 7.10). It was surprised to note the low percentage (29.18%) in saving the completed file (Table 7.11), i.e. less than 30% of the students were able to attain the basic level in "manage".

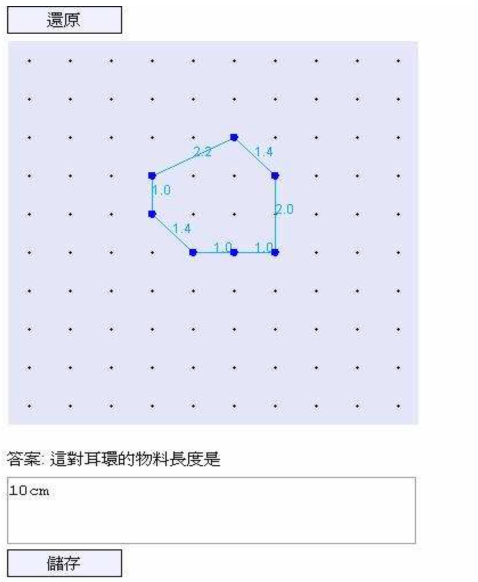
*Table 7.9 Percentage distribution of primary school students for each score of Q2 (Create) of Mathematics PA*

| **Score (%)** | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | | | |
| 60.37 | 0.10 | 39.53 | 100.00 | 0.79 | (0.98) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

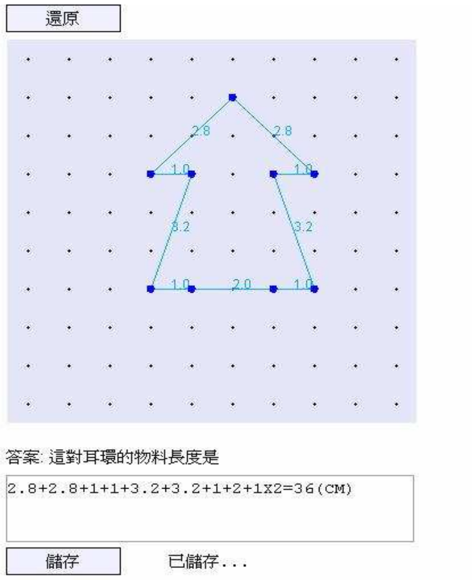
In Q2 (Create), 60.37% of the students got no mark in this question and this showed that many of them were not able to produce an earring in Christmas tree shape. Below shows an unsuccessful example by student (138011) who have no mark in Q2 (Create). Two explanations seemed possible: students were not able to produce a Christmas tree shape with the built-in software and they were not clear about the instruction of the question. This might explain the comparatively lower successful rate in this question.

Samples of students' work for Q2 (Create) of Mathematics PA

| | |
|---|---|
| Novice level (0 mark)<br>• Able to create a figure which does not fit the requirement(s) or unable to create any figure |  <br>(Student: 138011) |

Basic level (2 mark)

- Can produce the required Christmas tree shape earring with built-in software




(Student: 120021)

*Table 7.10 Percentage distribution of primary school students for each score of Q2 (Integrate) of Mathematics PA*

| Score (%) | | | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | 3.00 | | | |
| 59.58 | 36.61 | 1.49 | 2.32 | 100.00 | 0.47 | (0.65) |

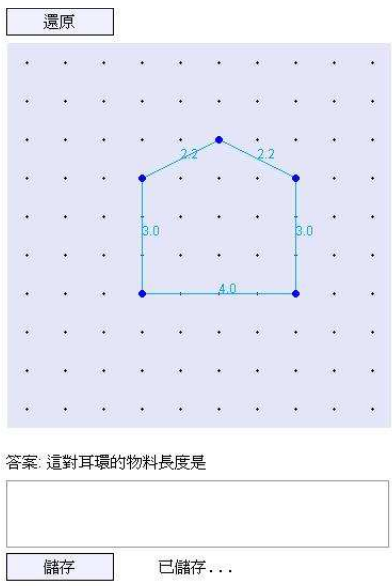
N=844

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Samples of students' work for Q2 (Integrate) of Mathematics PA

Novice level (0 mark)

- Cannot understand and integrate the information




(Student: 117004)

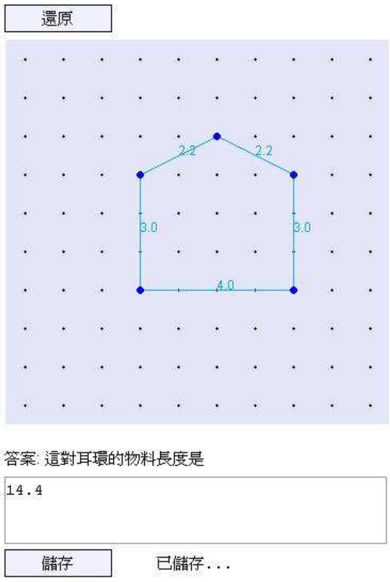
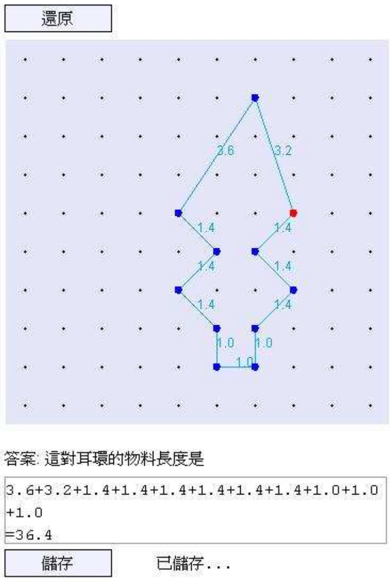
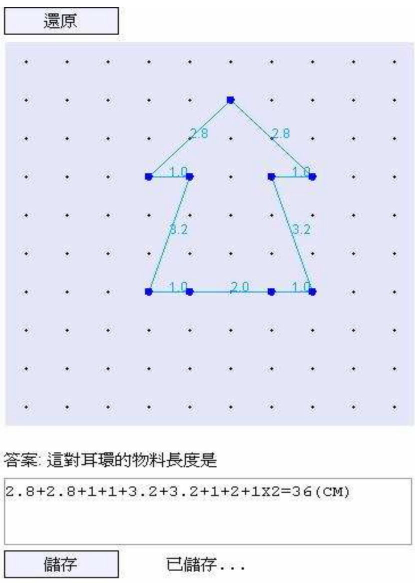
| | |
|---|---|
| Basic level (1 mark)<br>• Can accurately integrate part of the information | <br>(Student: 102002) |
| Proficient level (2 marks)<br>• Can accurately integrate information | <br>(Student: 123029) |
| Advanced level (3 marks)<br>• Accurate data integration and clear explanation | <br>(Student: 120021) |

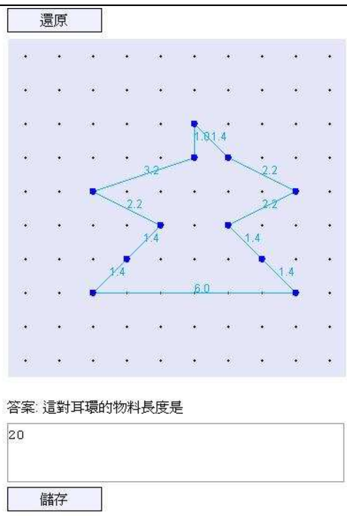
*Table 7.11 Percentage distribution of primary school students for each score of Q2 (Manage) of Mathematics PA*

| **Score (%)** | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|
| 0.00 | 1.00 | | | |
| 70.82 | 29.18 | 100.00 | 0.29 | (0.45) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Another interesting feature was that 70.82% of students got no mark in Q2 (Manage). There seems to be a large number of students who overlooked the requirement and forgot to save the diagram.

Samples of students' work for Q2 (Manage) of Mathematics PA

<table>
<tr><td>Novice level (0 mark)<br>• Cannot save the file of the shape</td><td>• No sample can be provided</td></tr>
<tr><td>Basic level (1 mark)<br>• Can save the file of the shape</td><td>

(Student: 141001)</td></tr>
</table>

### *7.4.2.3 Question 3*

Two dimensions, "create" and "integrate", were involved in this question. Tables 7.12 – 7.16 list the percentage distribution of primary school students for each score of Q3. Students had much better performance in "create" (Q3.1) in which 57.60%, 50.62%, and 49.60% of the students were able to record lengths, widths and areas of three rectangles with the built-in software and got full marks in Q3.1a, Q3.1b, and Q3.1c respectively (Tables 7.12 – 7.14). This indicated that the participants attained the basic skills in different "create" tasks. However, it was rather interesting to note that while they could complete these tasks, only a small portion of them (5.80% of the students got full marks) was able to finish the task successfully in calculating the biggest area of the rectangle in Q3.3.

In contrast, performance in "integrate" (Q3.2 and Q3.3) was much weaker. About 63% (Table 7.15) and 93% (Table 7.16) of students received no mark in Q3.2 and Q3.3 respectively. However, it was interesting to note that for the "integrate" dimension, 31.68% of the students got 1 mark in Q3.2 while only 1.07% got 1 mark and 5.80% got 2 marks in Q3.3. This implied that only a small portion of the participants were able to acquire the basic skill in getting the correct answers for length and width of the biggest area with the built-in software (Q3.3) while almost one-third of the students were able to acquire the basic skill in concluding some observations from facts collected with the same software (Q3.2). Nevertheless, 1.09% of the students got 3 marks and 3.69% got 2 marks in Q3.2, which showed that a small number of students had acquired the advanced or proficient skills in this question.

*Table 7.12 Percentage distribution of primary school students for each score of Q3.1a (Create) of Mathematics PA*

| **Score (%)** | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | | | |
| 37.66 | 4.74 | 57.60 | 100.00 | 1.20 | (0.96) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

*Table 7.13 Percentage distribution of primary school students for each score of Q3.1b (Create) of Mathematics PA*

| **Score (%)** | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | | | |
| 43.09 | 6.29 | 50.62 | 100.00 | 1.08 | (0.97) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

*Table 7.14 Percentage distribution of primary school students for each score of Q3.1c (Create) of Mathematics PA*

| **Score (%)** | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | | | |
| 45.56 | 4.84 | 49.60 | 100.00 | 1.04 | (0.97) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Samples of students' work for Q3.1a-c (Create) of Mathematics PA

Novice level (0 mark)

- Cannot use the built-in software [Numbers underlined = wrong answers]

| Set of rectangle | Length | Width | Area |
|---|---|---|---|
| 1st set (a) | <u>136</u> | <u>2</u> | <u>272</u> |
| 2nd set (b) | <u>34</u> | <u>8</u> | <u>272</u> |
| 3rd set (c) | <u>272</u> | <u>1</u> | <u>272</u> |

- (Student: 129009)

Basic level (2 mark)

- Can use the built-in software in producing 1 set of rectangle and record 1 set of length, width and area correctly [Numbers underlined = wrong answers]

| Set of rectangle | Length | Width | Area |
|---|---|---|---|
| 1st set | 12.75 | 59.25 | 755.437 |
| 2nd set | <u>5422</u> | <u>465465</u> | <u>54656</u> |
| 3rd set | <u>546564</u> | <u>456544</u> | <u>5464664</u> |

- (Student: 137032)

Proficient level (4 marks)

- Can use the built-in software in producing 2 sets of rectangle and record 2 sets of lengths, widths and areas correctly [Numbers underlined = wrong answers]

| Set of rectangle | Length | Width | Area |
|---|---|---|---|
| 1st set (a) | 53.75 | 18.25 | 980.937 |
| 2nd set (b) | 10.5 | 61.5 | 645.75 |
| 3rd set (c) | <u>57.75</u> | <u>15.25</u> | <u>822.937</u> |

- (Student: 119019)

Advanced level (6 marks)

- Can use the built-in software in producing 3 sets of rectangle and record 3 sets of lengths, widths and areas correctly

| Set of rectangle | Length | Width | Area |
|---|---|---|---|
| 1st set (a) | 33.25 | 38.75 | 1288.437 |
| 2nd set (b) | 57.25 | 14.75 | 844.437 |
| 3rd set (c) | 9.25 | 62.75 | 580.437 |

- (Student: 118002)

*Table 7.15 Percentage distribution of primary school students for each score of Q3.2 (Integrate) of Mathematics PA*

| **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | 3.00 | | | |
| 63.54 | 31.68 | 3.69 | 1.09 | 100.00 | 0.42 | (0.62) |

N=844

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Samples of students' work for Q3.2 (Integrate) of Mathematics PA

| | |
|---|---|
| Novice level (0 mark)<br>• Cannot accurately integrate and compare information or incorrect information | • 三角型 (Student: 115027)<br>• 他算出長度,闊度和面積都是相同 (Student: 129003)<br>• 能夠觀察到長方形，正方形一(Student: 138029) |
| Basic level (1 mark)<br>• Can integrate information | • 長方形的長度、闊度和面積的小數的小數點後的數字都能被 5 除盡。(Student: 119007)<br>• 觀察到很多變化 (Student: 121004)<br>• 我觀察到長方形的長度、闊度和面積的變化很神奇。(Student: 122031)<br>• 我觀察到如果長方形的長度、闊度和面積都不同 計算的方法和答案都不同 (Student: 141030) |
| Proficient level (2 marks)<br>• Can accurately integrate and compare information with inadequate to-the-point description | • 我從長方形的長度、闊度和面積的變化中能夠觀察到所有的周界都是 144 厘米。(Student: 118002)<br>• 我觀察到不同的長度、闊度可能會有不同的面積 (Student: 122006) |
| Advanced level (3 marks)<br>• Can accurately integrate and compare information with adequate to-the-point description | • 長度、闊度相距愈小,面積愈大;相反長度、闊度相距愈多,面積愈小。(Student: 120023) |

*Table 7.16 Percentage distribution of primary school students for each score of Q3.3 (Integrate) of Mathematics PA*

| **Score (%)** | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | | | |
| 93.14 | 1.07 | 5.80 | 100.00 | 0.13 | (0.48) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Samples of students' work for Q3.3 (Integrate) of Mathematics PA

| | |
|---|---|
| Novice level (0 mark)<br>• Cannot operate the software and understand the information | • 最大面積是 288 厘米，長方形的長度是 144cm，闊度是 2cm。(Student: 117026)<br>• 不會有答案 (Student: 119018) |
| Basic level (2 mark)<br>• Can operate the software and understand the information | • 長度和闊度分別是 36 (Student: 101007)<br>• 長度和闊度分別應該是３６厘米 (Student: 113035) |

Students seemed to have difficulty in using the built-in software to help them get the solutions for the problems of changes. Therefore, most of them appeared not able to understand the relational changes of length and width with area. Another feature was their description about their observations in brief and simple sentences; for example, “perimeter is the same” (周界都是相同), “anyway, the perimeter is 144 cm” (無論怎樣周界都是 144 米), “short length or short width, then small area” (長度短或闊度短面積就小) and “having decimal points” (有小數點).

#### *7.4.2.4 Question 4*

This question assessed students’ “manage” skills and the proficient level was expected. They needed to categorize seven shapes into two classes with another piece of built-in software (Figure 7.2). According to Table 7.17, 25.27% and 25.80% of the students got 3 or 4 marks respectively. In other words, about 51% of the students attempted this question and displayed the “manage” skills at the proficient level. Those who got 1 mark (7.77%) or 2 marks (11.93%) had demonstrated their basic skills in this area. Around 30% of the students got no mark because either they could not finish the task successfully or they did not attempt this question.

*Table 7.17 Percentage distribution of primary school students for each score of Q4 (Manage) of Mathematics PA*

| **Score (%)** | | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | 3.00 | 4.00 | | | |
| 29.23 | 7.77 | 11.93 | 25.27 | 25.80 | 100.0 | 2.11 | (1.59) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- “Score (%)”, “Mean Score” and “SD” are weighted statistics.
- Figures may not sum to 100 percent because of rounding

The overall students’ performance was satisfactory in this question. Some students were even able to give a complete set of correct answers. Findings in this question did not seem to be consistent with those in Q2 though both questions required the use of built-in software. Therefore, there might be some unknown factors affecting students’ performance in Q2.

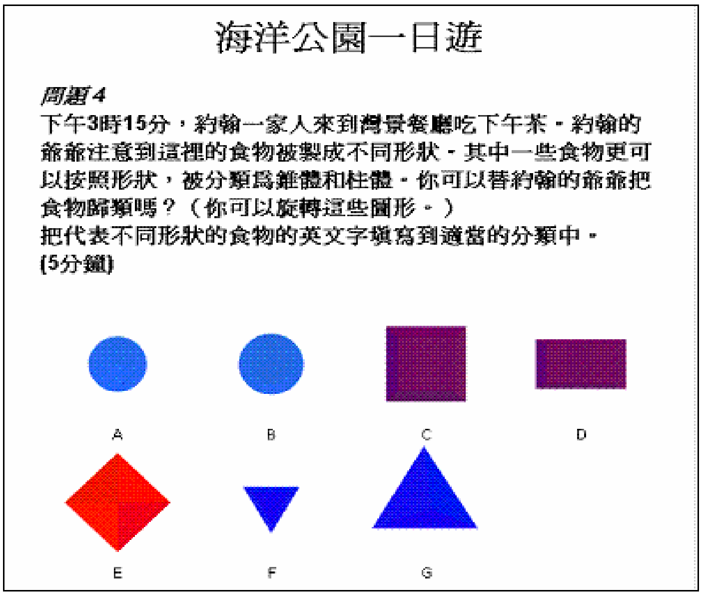



*Figure 7.2 Students group the shapes into two classes in Q4 of the assessment*

Samples of students' work for Q4 (Manage) of Mathematics PA

| | |
|---|---|
| Novice level (0 mark)<br>• Cannot operate the software and understand the information | • Cone shape: 坏; Cylinder shape: 灶壬壬 (Student: 116032) |
| Basic level (1 mark)<br>• Can operate the software but with 5-6 errors or missing information | • Cone shape: F,G; Cylinder shape: A,B (Student: 111001) |
| Basic level (2 marks)<br>• Can operate the software but with 3-4 errors or missing information | • Cone shape: F,G; Cylinder shape: A,B,C,D,E (Student: 119007) |
| Proficient level (3 marks)<br>• Can operate the software but with 1-2 errors or missing information | • Cone shape: A,E,G; Cylinder shape: B,C,D,E,F (Student: 141009) |
| Proficient level (4 marks)<br>• Can operate the software and fully understand the information | • First Group: A,E,G; Second Group: B,C,D,F (Student: 136033) |

### *7.4.2.5 Question 5*

"Manage" was also an area to be assessed in Q5. The expected levels to be attained by the students were "advanced" and "basic". The main task for this question was to ask students to re-organize the given data and to provide reasonable explanations (for the advanced level), as well as to save the diagrams as in Q2 (for the basic level). Another dimension to be assessed was "communicate". The main task was to fill in an email and send it to a teacher. Students who successfully completed this task should have acquired the advanced "communicate" skill.

For data re-organisation at the advanced level in the "manage" dimension, only a very small portion of them (1.78%) got 3 marks (Table 7.18). About 24% of the students got 1 mark which indicated that they either gave partially correct answer or provided no explanation. Those who got 2 marks (3.52%) gave explanation to their responses and were considered to have acquired the proficient level in re-organising data. About 70% of them got no mark in this question.

According to Table 7.19, about 46% of the students got 1 mark and reached the basic level, i.e. able to save the diagram in the appropriate file. They sent their emails to their teacher's email address: teacher@cite.hku.hk. The samples of students' work given were the contents of students' emails to their teacher. 53.97% of them got no mark in this question.

*Table 7.18 Percentage distribution of primary school students for each score of Q5 (Manage-advanced) of Mathematics PA*

| **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | 3.00 | | | |
| 70.76 | 23.94 | 3.52 | 1.78 | 100.00 | 0.36 | (0.64) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Samples of students' work for Q5 (Manage – advanced) of Mathematics PA

| | |
|---|---|
| Novice level (0 mark)<br>• Unable to re-organize data | • 水母萬花筒 (Student: 117030)<br>• 找到答案是第一那圖 (Student: 126022) |
| Basic level (1 mark)<br>• Re-organize part of the data in one of the graphics without clear description | • 圖 1 的圖是 8 分之 3,因爲它原本是 16 分之 6 如果÷2 就=8 分之 3 (Student: 101033)<br>• 圖 2,因爲它有 4 個菱形,8 個三角形。8 個三角形變成 4 個菱形 =8 個菱形, 8 個菱形中有 3 個佔有陰影部分, 所以圖 2 陰影部分的面積佔全圖總面積的八分之三。 (Student: 106010)<br>• 圖 1 的陰影部份是佔八份之三。把它分成 16 份，你會看見有 6 份是陰影。只要將 16 份之 6 約簡，就會得到 8 份之 3 這個答案。(Student: 108031) |
| Proficient level (2 marks)<br>• Re-organize data in both graphics | • 圖 1.2 的陰影部分的面積佔全圖總面積的八分之三 (Student: 105035)<br>• 我將圖 1, 2 分成十六分,圖 1, 2 都是 (Student: 113036) |

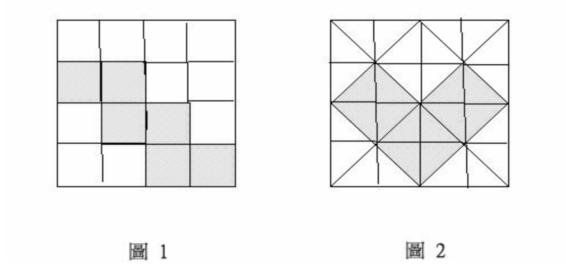
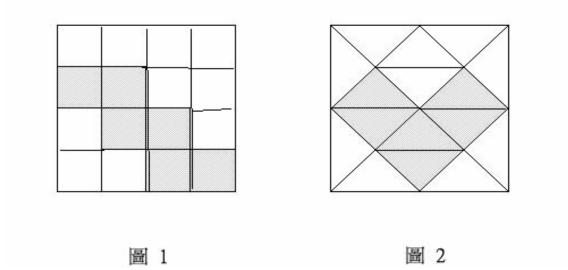
| | |
|---|---|
| Advanced level (3 marks)<br>• Re-organize data in both graphics with clear description | • 圖 1 和 2 佔全部的八分之三,因爲一個正方形代表一,兩個三角形代表一,這一共有八個正方形,陰影部分的面積佔全圖總面積的八分之三 (Student: 112002) |

*Table 7.19 Percentage distribution of primary school students for each score of Q5 (Manage-basic) of Mathematics PA*

| **Score (%)** | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|
| 0.00 | 1.00 | | | |
| 53.97 | 46.03 | 100.00 | 0.46 | (0.50) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Samples of students' work for Q5 (Manage – basic) of Mathematics PA

| | |
|---|---|
| Novice level (0 mark)<br>• Cannot save the file | No sample can be provided |
| Basic level (2 mark)<br>• Can save the file | <br>(Student: 108028)<br><br>(Student: 120023) |

Results from Table 7.20 showed that slightly more than one-fifth of the students attained the proficient level (21.10% got 2 marks), less than one-fifth of the students attained the basic level (18.63% got 1 mark), and a small portion of them (5.22% got 3 marks) attained the advanced level in the "communicate" dimension. About half of the students (55.04%) got no mark in this item.

*Table 7.20 Percentage distribution of primary school students for each score of Q5 (Communicate) of Mathematics PA*

| **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | 3.00 | | | |
| 55.04 | 18.63 | 21.10 | 5.22 | 100.00 | 0.77 | (0.96) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Samples of students' work for Q5 (Communicate) of Mathematics PA

| | |
|---|---|
| Novice level (0 mark)<br>• Cannot fill in the email address and topic description | • 老師，黃小英 (Student: 107028)<br>• 訴老師，我知道了(Student: 118005)<br>• teacher, beautiful (Student: 141005) |
| Basic level (1 mark)<br>• Can fill in the email address and topic with unclear description | • teacher@cite.hku.hk，圖 1 及 2 (Student: 129021)<br>• teacher@cite.hku.hk，圖形 (Student: 137039)<br>• teacher@cite.hku.hk，總面積的八分之三 (Student: 140032)<br>• teacher@cite.hku.hk，原因 (Student: 141009) |
| Proficient level (2 marks)<br>• Can fill in the email address and topic and the description need further polish | • teacher@cite.hku.hk，水母萬花筒 (Student: 119004)<br>• teacher@cite.hku.hk，那圖的面積 (Student: 118033) |
| Advanced level (3 marks)<br>• Can fill in the email address and topic with clear description | • teacher@cite.hku.hk，哪幅圖 的陰影部分的面積佔全圖總面積的八分之三？親愛的老師，答案是圖 2,因爲圖 2 分成 8 份，拿了 3 份. 學生佐靈敬上 (Student: 125030) |

Regarding the saving task in Q5 (Manage – basic) and Q2 (Manage), it was found that the percentage of students who got full marks in Q5 (46.03% in Table 7.19) was much higher than that in Q2 (29.18% in Table 7.11). One possible reason was that students were not able to draw the required shape successfully in Q2 and therefore, affected their performance in the subsequent part of the question. Nevertheless, they needed to re-organize data related to the graphics in Q5. In other words, the design task of "Christmas tree shape" might pose a problem to the students.

#### *7.4.2.6 Question 6*

Students were required to complete three tasks related to "access" (Q6.1), "integrate" (Q6.2) and "evaluate" (Q6.2) in this question. Students were expected to reach the basic level in the "evaluate" dimension as well as the advanced level in both "integrate" and "access" dimensions. After performing online search, students needed to do some calculations and to compare the results. Then they should make a right judgment on their answers.

In Q6.1 (Access), according to Table 7.21, 6.33% of the students got 1 mark, 3.67% got 2 marks and 3.82% got 3 marks. Up to 86.18% of the students got no mark in this item. This indicated that a scanty of participants achieved the advanced level in the "access" dimension in this question. These students could make use of relevant online information to help them get the right answers. Students attaining the proficient level were also able to apply appropriate online information but they did not provide any clear description. For those who attained basic level, their answers were not completely correct.

*Table 7.21 Percentage distribution of primary school students for each score of Q6.1 (Access) of Mathematics PA*

| **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | 3.00 | | | |
| 86.18 | 6.33 | 3.67 | 3.82 | 100.00 | 0.25 | (0.70) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Samples of students' work for Q6.1 (Access) of Mathematics PA

| | |
|---|---|
| Novice level (0 mark)<br>• Access with search engine but retrieve irrelevant items | • 中環七號碼頭和金鐘地鐵站 (Student: 101001)<br>• 分別在終點是銅鑼灣 (Student: 104020)<br>• 海洋公園 (Student: 116011) |
| Basic level (1 mark)<br>• Retrieve some appropriate information with search engine | • 深灣巴士總站 石排灣巴士總站 (Student: 112019)<br>• 72A 深灣道 11 號雅濤閣內,76 漁光道漁暉苑安暉閣對面(Student: 123006)<br>• 黃竹坑 72A 石排灣７６(Student: 116008)<br>• 72A:深灣 76:石排灣 (Student: 137040) |
| Proficient level (2 marks)<br>• Retrieve appropriate information but no clear description | • 黃竹坑／深灣 香港仔／石排灣 (Student: 111009)<br>• 深灣 石排灣 (Student: 122010) |
| Advanced level (3 marks)<br>• Retrieve appropriate information and give clear description | • 72A 的路線的起點是深灣巴士總站, 76 的路線的起點是石排灣巴士總站 。(Student: 129008)<br>• 72A:深灣巴士總站 76:石排灣巴士總站 (Student: 137030) |

In both Q6.2 (Integrate) and Q6.2 (Evaluate), similar results were obtained: 6.83% of the students got 1 mark, 2.32% got 2 marks and 0.31% got 3 marks in the dimension of "integrate" (Table 7.22), as well as 2.06% got 1 mark, 3.98% got 2 marks and 1.52% got 4 marks in the dimension of "evaluate" (Table 7.23). About 90% of the students got no mark in both dimensions probably indicated that comparatively weak abilities of the students in the "integrate" and "evaluate" dimensions.

*Table 7.22 Percentage distribution of primary school students for each score of Q6.2 (Integrate) of Mathematics PA*

| **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | 3.00 | | | |
| 90.53 | 6.83 | 2.32 | 0.31 | 100.00 | 0.12 | (0.42) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Samples of students' work for Q6.2 (Integrate) of Mathematics PA

| | |
|---|---|
| Novice level (0 mark)<br>• Cannot understand and integrate the information accurately | • 我會建議他們乘搭數碼港 / 華富（北) 因爲時間會比較快 (Student: 141030)<br>• 5.3*2=10.6 (Student: 118007)<br>• 不知道 (Student: 143002) |
| Basic level (1 mark)<br>• Cannot integrate the information accurately | • 76:2.5+5 =7.5 72A:4.5+2.3 =6.8 (Student: 129021)<br>• 72A: 4.5x2=9 76: 5x2=10 我會建議他們乘搭 72A，因車費較便宜和較少分站 (Student: 138012)<br>• 72A 車資 4.5 元, 76 車資 7.5 元(Student: 138030)<br>• 72a,因爲快 (Student: 142025) |
| Proficient level (2 marks)<br>• Integrate the information accurately | • 76: 7.5 元 72A: 6.8 元 建議他們乘搭 72A 因爲 72A 途經香港仔隧道收費廣場而 76 就不經 (Student: 137028)<br>• 72A: 4.5 + 2.3 = 6.7 76: 5 + 5 = 10 我會建議他們乘搭 72A，因爲比較便宜！！！！(Student: 139030) |
| Advanced level (3 marks)<br>• Integrate the information accurately and describe clearly | • 我 建 議 72A: $2.3+$4.5=$6.8 價 錢 便 宜 76: $5.0+$2.5=$7.5 (Student: 122036) |

*Table 7.23 Percentage distribution of primary school students for each score of Q6.2 (Evaluate) Mathematics PA*

| **Score (%)** | | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|---|
| 0.00 | 1.00 | 2.00 | 3.00 | 4.00 | | | |
| 92.44 | 2.06 | 3.98 | 0.00 | 1.52 | 100.00 | 0.16 | (0.63) |

N=844
N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Samples of students' work for Q6.2 (Evaluate) of Mathematics PA

| | |
|---|---|
| Novice level (0 mark)<br>• Cannot make right judgment | • 72A:1.7+1.7 = 3.4 76:1.7+1.7 =3.4 兩個也可,因爲一樣錢 (Student: 106033)<br>• done (Student: 120008)<br>• 我會建議他們乘搭數碼港 / 華富（北) 因爲時間會比較快 (Student: 141030) |
| Basic level (2 mark)<br>• Can make right judgment | • 9 元 72A 因爲它快過 76 (Student: 105033)<br>• 72A 因爲只要車資 6.8$ (Student: 113008)<br>• 72a－4.5+2.3=6.8 76-5+2.5=7.5 (Student: 125029)<br>• 76: 7.5 元 72A: 6.8 元 建議他們乘搭 72A 因爲 72A 途經香港仔隧道收費廣場而 76 就不經 (Student: 137028) |
| Basic level (4 marks)<br>• Can make right judgment and give reasonable explanation | • 我建議 72A: \$2.3+\$4.5=\$6.8 價錢便宜 76: \$5.0+\$2.5=\$7.5 (Student: 122036)<br>• 72A: 4.5x2=9 76: 5x2=10 我會建議他們乘搭 72A，因車費較便宜和較少分站 (Student: 138012) |

## 7.5 Students' Performance across Primary Schools

In the last two sections, students' performance in individual dimensions and questions were reported. In this section, students' performance across primary schools was explored. Students from most schools showed better performance in the "define", "access", "manage", and "create" dimensions with mean score percentages of 59.67%, 46.22%, 35.67%, and 51.50% respectively (Table 7.24). Comparatively weaker performance was observed in the dimensions of "integrate", "communicate", and "evaluate" with respective mean score percentages of 16.43%, 25.67%, and 4.00%. Moreover, when the "total" score in Mathematics PA across schools was examined, there displayed a big gap between the minimum total score (7.17) and the maximum (24.08), and the standard deviation was 4.20. Larger school differences were also displayed in "manage" (SD=1.17) and "create" (SD=1.27). It was also interesting to note that in some schools, all students got no mark in the dimensions of "evaluate" and "communicate", and there were little differences across schools in these two dimensions (respective SDs were 0.21 and 0.46).

The boxplots of students' performance of the 7 dimensions of IL in the Mathematics PA across primary schools (Figure 7.3) also reflected small dispersion in the dimensions of "define" and "evaluate", but larger dispersion in the dimensions of "access", "manage", "integrate", and "create" was noted. There was no outlier in the dimensions of "access", "manage", "integrate", and "communicate". Apparently, better performance in the dimension of "evaluate" was observed in two schools (school 112 and 138) and there was one school with apparently poorer performance in each of the dimension of "create" (school 132) and "define" (school 121).

*Table 7.24 Mean scores of 8 IL indicators in Mathematics PA for 40 primary schools*

| IL Indicator | Min | Max | Mean Score | (SD) | Full Score | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|
| Define | 0.83 | 2.4 | 1.79 | (0.36) | 3 | 59.67 |
| Access | 2.44 | 5.54 | 4.16 | (0.90) | 9 | 46.22 |
| Manage | 0.17 | 5.16 | 3.21 | (1.17) | 9 | 35.67 |
| Integrate | 0.89 | 4.17 | 2.3 | (0.84) | 14 | 16.43 |
| Create | 0.67 | 6.42 | 4.12 | (1.27) | 8 | 51.50 |
| Communicate | 0 | 1.96 | 0.77 | (0.46) | 3 | 25.67 |
| Evaluate | 0 | 0.94 | 0.16 | (0.21) | 4 | 4.00 |
| Total | 7.17 | 24.08 | 16.51 | (4.20) | 50 | 33.02 |

N=40
N. B. - N listed in the table is the unweighted number of schools.
- "Mean Score" and "SD" and "Mean Score Percentage (%)" are weighted statistics.

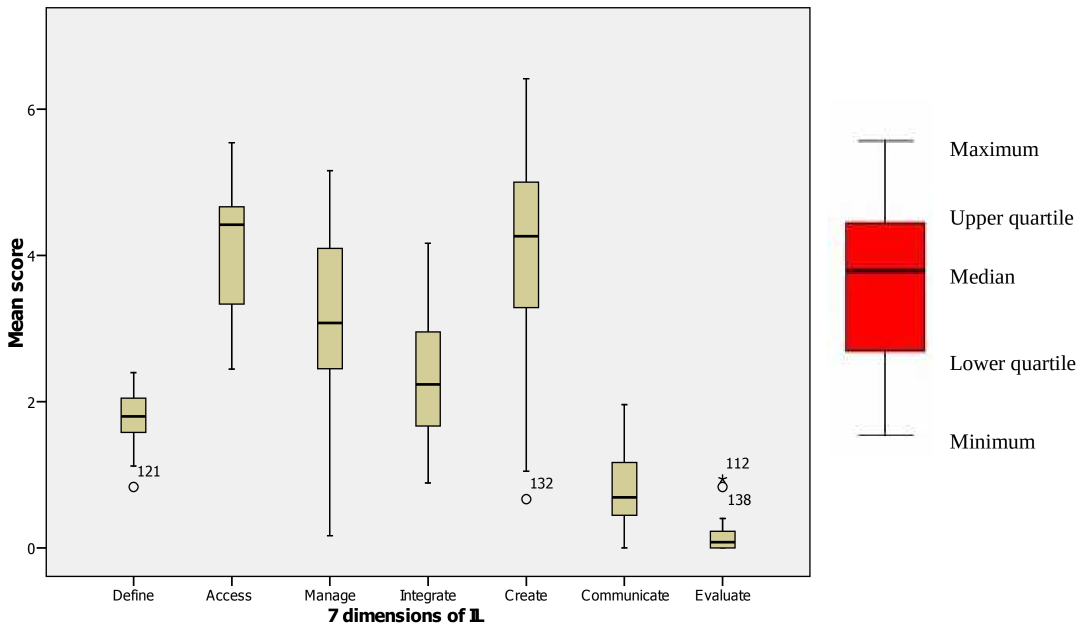



*Figure 7.3 Students' IL performance in Mathematics PA across primary schools*

In order to investigate if there were any significant differences in 8 IL indicators of Mathematics PA across primary schools, an ANOVA was conducted. Results indicated that significant differences were found across schools in students' performance (Table 7.25).

*Table 7.25 ANOVA of 8 IL indicators across primary schools in Mathematics PA*

| IL Indicator | df | F | Sig. |
|---|---|---|---|
| Define | 39,804 | 2.68 | 0.00* |
| Access | 39,804 | 4.18 | 0.00* |
| Manage | 39,804 | 6.38 | 0.00* |
| Integrate | 39,804 | 4.72 | 0.00* |
| Create | 39,804 | 4.21 | 0.00* |
| Communicate | 39,804 | 5.65 | 0.00* |
| Evaluate | 39,804 | 2.39 | 0.00* |
| Total | 39,804 | 7.46 | 0.00* |

N.B. - Difference significant if Sig (p) <0.05.

## 7.6 Comparing the Difficulty Levels of the Seven Dimensions of Information Literacy in Mathematics Performance Assessment

In order to understand the difficulty levels of the 7 IL dimensions in Mathematics PA, mean score percentages of the students who had actually attempted the questions in primary schools were compared, i.e. excluding those “not-reached” and “non-response” students. As shown in Table 7.26, higher mean score percentages were noted in the “define” (58.84%), “access” (45.53%) and “create” (52.39%) dimensions when compared with those in the dimensions of “communicate” (36.99%), “manage” (36.58%), “integrate” (16.29%), and “evaluate” (11.67%). This implied that students encountered least difficulty in the questions that assessed the “define”, “access” and “create” dimensions. In other words, they found it more difficult to complete the task associated with the dimensions of “communicate”, “manage”, “integrate” and “evaluate”

On one hand, the high incompletion rate after Q4 was an indicator to students’ unsatisfactory time management. This might explain why there was weaker performance in the dimension of “evaluate” and “communicate” because tasks related to these two dimensions were at the last part of the assessment. On the other hand, tasks related to dimensions of “communicate”, “manage”, “integrate” and “evaluate” required higher-order thinking skills. This might have imposed difficulty on students to complete the task satisfactorily. The third factor was related to their lack of exposures to online assessment.

*Table 7.26 Mean scores of primary school students (excluding those "not-reached" and "non-response" students) across the 8 IL indicators of Mathematics PA*

| IL Indicator | N | Min | Max | Mean Score | (SD) | Full Score | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| Define | 843 | 0.00 | 3.00 | 1.77 | (1.04) | 3 | 58.84 |
| Access | 844 | 0.00 | 9.00 | 4.10 | (2.20) | 9 | 45.53 |
| Manage | 824 | 0.00 | 9.00 | 3.29 | (2.27) | 9 | 36.58 |
| Integrate | 838 | 0.00 | 11.00 | 2.28 | (1.94) | 14 | 16.29 |
| Create | 825 | 0.00 | 8.00 | 4.19 | (2.90) | 8 | 52.39 |
| Communicate | 588 | 0.00 | 3.00 | 1.11 | (0.97) | 3 | 36.99 |
| Evaluate | 302 | 0.00 | 4.00 | 0.47 | (1.00) | 4 | 11.67 |
| Total | 844 | 0.00 | 38.00 | 16.38 | (7.95) | 50 | 32.76 |

N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD", and "Mean Score Percentage (%)" are weighted statistics.

In principle, students' performance in the dimensions of "create", "manage", "integrate", "communicate" and "evaluate" might be associated with the requirement of higher-order thinking skills of these dimensions. Nevertheless, higher-order thinking skills may not fully explain students' performance in the "create" dimension because they were only asked to use the built-in software to handle the simple task(s) in the "create" dimension in Q2 and Q3. It was also observed that the task completion rate in Q2 (Create) was higher than that of Q3.1 a-c (Create) (Appendix 7.1), while a much better performance in terms of the mean score percentage (Table 7.3) in Q3.1 a-c (Create) was observed. Hence, as explained in the last paragraph in section 7.4.2.5, the design task using the built-in software in Q2 might be unexpectedly difficult for most of the students. This observation might call for the refinement of task design and the adjustment of the scoring rubric in the future.

## 7.7 Summary

### *7.7.1* Task Completion Rates

The aforementioned results showed that the completion rates of the first three questions were very good. Starting from Q4, there exhibited a decline in students' responses and the lowest completion rate was found in Q6. This was possibly associated with students' limited exposure to such kind of online questions. Unfamiliarity might cause the students to spend more time on the first three questions. This in turn affected their time management and their task completion rate dropped sharply in questions 5 and 6 as result. The figures of respondents who did not reach the questions (Appendix 7.1) might support the observation.

### *7.7.2* Performance in Key Tasks

Questions set across the seven IL dimensions in Mathematics PA could be categorized into three key tasks. We were able to observe students' performance in using built-in software to tackle the problems, in on-line search, and in data re-organisation. When answering Q2, Q3 and Q4, students had to make use of the built-in software. The dimensions covered "create", "integrate" and "manage". Students seemed to perform well in using built-in software to "create" in Q3. They showed satisfactory performance in "manage" in Q4 but unsatisfactory performance in the dimension of "integrate" in Q2 and Q3.

Although similarly unsatisfactory performance in the "integrate" dimension as above also existed in online search which covered assessment in the dimensions of "define", "access", "integrate", and "evaluate" in Q1 and Q6, students' performances in the dimensions of "define" and "access" in online search were outstanding in Q1. Moreover, when compared with the main task of data re-organisation in Q5, students' performance was satisfactory in saving files, which was part of the "manage" task in Q5 (Table 7.3).

### *7.7.3* Performance in Individual Information Literacy Dimensions

In general, students had better performance in "define", "create", and "access", an average performance in "manage", but weaker performance in "integrate", "communicate", and "evaluate". However, in a comparatively in-depth analysis, there was a mixed performance found in such dimensions as "access", "create", and "manage". The performance in "integrate" was also mixed with a satisfactory result in one question and four poorest results in four other questions assessing "integrate".

Time management factor may explain the poor performance in "evaluate" but might not explain the weaker performance in the dimensions of "integrate" and the mixed performance in "create" and "manage". Limited exposure to online assessments and lack of higher-order thinking skills were likely two additional factors affecting students' performance in "create", "manage", "integrate", and "communicate". Weak performances in Q5 (Manage – advanced), which assessed students in explaining the rationale of data re-organisation, and Q2 (Create), which assessed the design ability of students, were two examples reflecting students' weaker higher-order thinking skills.

## 7.8 Recommendations

As explained above, students' unsatisfactory time management skills and weaker higher-order thinking skills were three possible causes of students' relatively weaker performance in dimensions such as "manage", "integrate", "create", "communicate", and "evaluate". In other words, the challenge primary school educators are facing is how to improve students' competence in these aspects in Mathematics learning. There are three aspects which need to be considered in relation to this goal.

Firstly, it is recommended that more online exposure and technology-supported learning opportunities for students in Mathematics learning in primary schools should be provided so that students will be more familiar with online learning and teaching environments, as well as online assessment.

Secondly, since Mathematics Education is an important KLA, and development of the aforementioned five dimensions are important in Mathematical understanding. The challenge is how to integrate these IL dimensions into Mathematics learning in primary schools with the help of ICT. Moreover, differences across the primary schools are obvious in the findings. Hence, it is recommended that there should be a multi-level integration of Mathematics curriculum and ICT for schools with various backgrounds and culture. It is crucial to develop students' information literacy and Mathematical ability through various engagements of ICT.

Thirdly, a multi-purpose pedagogical approach with solid integration of Mathematics curriculum and information literacy should be adopted. It aims to provide support to strengthen what students can do and reason about on their path to understanding in IL and Mathematics, as well as to bringing real-world problems into their learning experience through the use of ICT.

# Chapter 8 Findings on Science Performance Assessment

This chapter reports the general findings of both secondary and special school students' Information Literacy (IL) performance in Science Performance Assessment (PA). Altogether 866 students took the assessment. 845 were from the secondary schools and 21 were from the special schools. General description of the assessment tasks and respective percentages of task completion will be presented first. Secondly, overall descriptive performance in IL of Science PA will be delineated. Thirdly, students' performance at item level as well as students' authentic work will be described. Fourthly, students' performance across the secondary schools will be explored. Finally, difficulty levels of the seven IL dimensions as well as summary and recommendations will be reported. All descriptive statistics will be weighted for students in the secondary schools but not for the special schools.

## 8.1 Description of the Assessment Tasks

There were a total of seven main questions in the PA. Students were required to complete the assessment in 45 minutes. The assessment tasks were designed in line with the curriculum in Integrated Science and subject matter included the learning units 2 (Looking at living things) and 7 (Living things and air). The scenario of the assessment was a visit to the Kadoorie Farm. The total score of the assessment is 50. Table 8.1 provides a brief description of each task and the distribution of the 7 IL dimensions in this assessment accordingly.

*Table 8.1 Task description and IL dimensions of Science PA*

| | | Brief description of the question | IL Dimension(s) | Highest Competence Level Attained | Score |
|---|---|---|---|---|---|
| Part 1 | Q1. | Students were asked to find the relevant map by the Internet search | | | |
| | 1.1 | To "define" appropriate keywords for the information search | Define | Advanced | 3 |
| | 1.2 | To write down the URL(s) which provide the information | Access | Advanced | 3 |
| | 1.3 | Able to retrieve appropriate information and download relevant information | Access | Advanced | 3 |
| | | | Manage | Basic | 1 |
| | Q2 | Students were asked to identify related information from some websites | | | |
| | 2.1 | To identify the endangered species | Define | Advanced | 3 |
| | 2.2 | To identify the suitable habitat for this endangered species | Define | Advanced | 3 |
| | Q3 | Students were asked to create a classification diagram | | | |
| | 3.1 | To classify the animals and plants into four suitable categories. | Manage | Advanced | 6 |
| | 3.1 | To create a classification diagram | Create | Advanced | 3 |
| | 3.2 | To save the classification diagram | Manage | Basic | 1 |

*Table 8.1 Task description and IL dimensions of Science PA (Continued)*

| | Brief description of the question | IL Dimension(s) | Highest Competence Level Attained | Score |
|---|---|---|---|---|
| Part 2 | Q4. Students were asked to operate the simulation programme and interpret information from the simulation programme | Integrate | Advanced | 3 |
| | Q 5. Students were asked to operate the simulation programme and interpret the information from the simulation programme | Integrate | Advanced | 3 |
| | Q 6. Students were asked to interpret data in the graph and present the information | Integrate | Advanced | 3 |
| | Q 7.1. Students were asked to interpret data and to draw conclusion(s) from the data as well as give reasonable explanation(s) for the observed phenomena | Integrate | Advanced | 3 |
| | Q 7.2. Students were asked to interpret data and to draw conclusion(s) from the data as well as give reasonable explanation(s) for the observed phenomena | Integrate | Advanced | 3 |
| | Q 7.3. Students were asked to interpret data and to generate and summarise possible impacts | Evaluate | Advanced | 3 |
| | Q 7.4. Students were asked to generate one reasonable guideline and use the chat room to discuss with classmates | Evaluate | Advanced | 3 |
| | | Communicate | Advanced | 3 |

## 8.2 Task Completion

Figures 8.1 and 8.2 show the percentages of task completion in secondary and special schools respectively (for detailed information, please refer to Appendices 8.1 and 8.2). Generally speaking, over 60% of the secondary school students had successfully completed Q1 to Q6 but starting from Q7, the percentage of task completion dropped to 48.41%. It might be due to the limitation of time that students could not complete the last few questions. It was also observed from Figure 8.1 that for Q1.3 and Q3, the percentages of task completion dropped about 20%. Only about 80% of the students had attempted these two questions.

For special schools, nearly all students had attempted Q1.1, Q1.2, Q2.1 and Q2.2. For Q1.3 and Q3, there were only around 65% of the students who had attempted the questions. Starting from Q7.1, less than 60% of the students had attempted the question and only around 30% of the students had made an effort in answering Q7.4 (communicate), i.e. using the chat room for discussion.

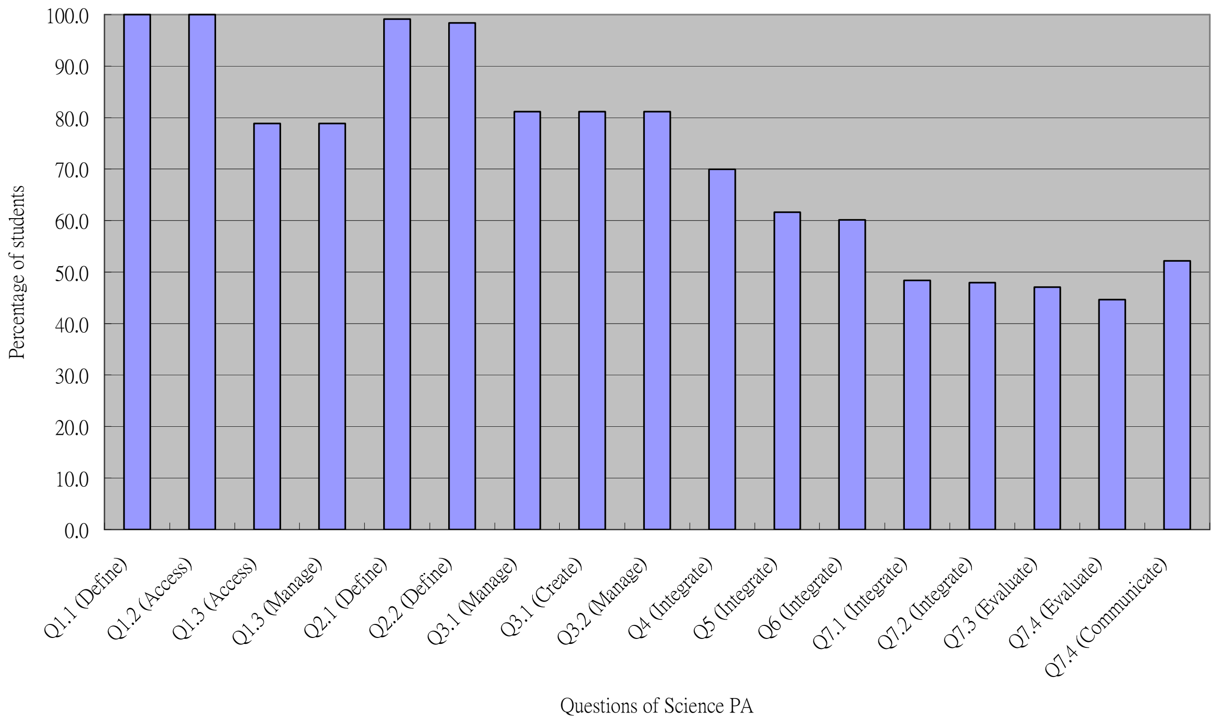



*Figure 8.1 Percentages of secondary school students in completing the tasks of Science PA*

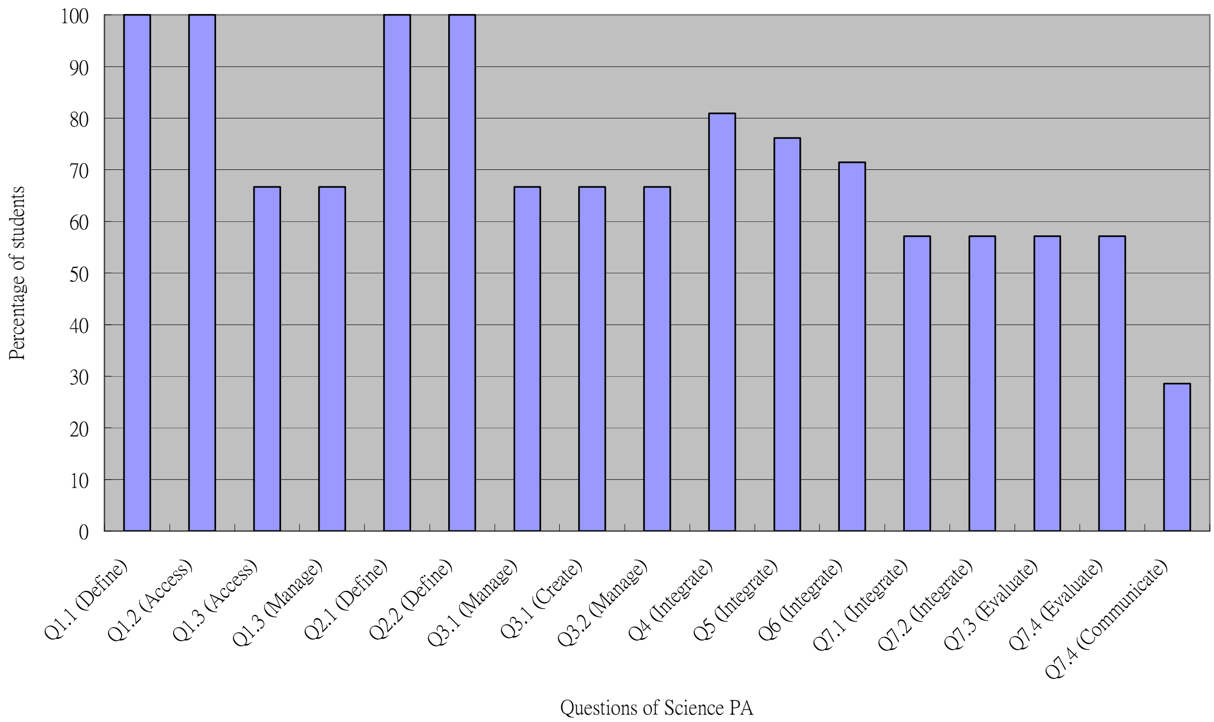



*Figure 8.2 Percentages of special school students in completing the tasks of Science PA*

## 8.3 Students’ Overall Performance in Information Literacy of Science Performance Assessment

Students’ overall performance in secondary schools will be presented first. Then students’ overall performance in special schools will be described. The Project Team would like to point out that as the full score of each IL dimension is not the same, only looking at the mean scores may not be sufficient for comparison to be made across dimensions. It is also necessary to look at mean score percentages for comparison purpose.

### 8.3.1 Secondary Schools

The overall performance in IL of Science PA was examined and the mean score of each indicator at secondary schools was presented in Table 8.2. Among the 7 dimensions, students’ performance in ‘‘access’’ and “define”, were better than the other dimensions. The mean score for ‘‘access’’ was 2.23 with the full score of 6 marks and the mean score for “define” was 2.96 with the full score of 9 marks. The mean score percentages for “define” and ‘‘access’’ were 32.89% and 37.17% respectively. Students’ performance in the “evaluate” dimension was poor. The full score for “evaluate” was 6 marks but the mean score for secondary school students was 0.48 only. The mean score percentage was just 8%.

The maximum “total” score for students in the secondary schools was 36 out of 50. The “total” mean score was 10.24 (SD=5.9) for the secondary schools. According to the mean score percentages, the descending order for students’ achievement in the 7 dimensions of IL was: “access”, ‘‘define’’, “communicate”, ‘‘manage’’, “create”, ‘‘integrate’’, and “evaluate”.

*Table 8.2 Mean scores of secondary school students in 8 IL indicators of Science PA*

| IL Indicator | Minimum (Min) | Maximum (Max) | Mean Score (a) | (SD) | Full Score (b) | Mean Score Percentage (%) (a)/(b) x 100% |
|---|---|---|---|---|---|---|
| Define | 0.00 | 8.00 | 2.96 | (1.87) | 9 | 32.89 |
| Access | 0.00 | 6.00 | 2.23 | (1.89) | 6 | 37.17 |
| Manage | 0.00 | 8.00 | 1.54 | (1.59) | 8 | 19.25 |
| Integrate | 0.00 | 13.00 | 1.90 | (2.63) | 15 | 12.67 |
| Create | 0.00 | 3.00 | 0.39 | (0.67) | 3 | 13.00 |
| Communicate | 0.00 | 3.00 | 0.74 | (0.80) | 3 | 24.67 |
| Evaluate | 0.00 | 5.00 | 0.48 | (1.06) | 6 | 8.00 |
| Total | 0.00 | 36.00 | 10.24 | (5.90) | 50 | 20.48 |

N=845

N.B. - N listed in the table is the unweighted number of students.
- “Mean Score”, “SD” and “Mean Score Percentage (%)” are weighted statistics.

### 8.3.2 Special Schools

*Table 8.3 Mean scores of special school students in 8 IL indicators of Science PA*

| IL Indicator | Min | Max | Mean Score | (SD) | Full Score | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|
| Define | 0.00 | 7.00 | 2.95 | (2.09) | 9 | 32.78 |
| Access | 0.00 | 5.00 | 1.90 | (1.64) | 6 | 31.67 |
| Manage | 0.00 | 4.00 | 0.90 | (1.30) | 8 | 11.25 |
| Integrate | 0.00 | 7.00 | 1.05 | (2.13) | 15 | 7.00 |
| Create | 0.00 | 1.00 | 0.29 | (0.46) | 3 | 9.67 |
| Communicate | 0.00 | 1.00 | 0.29 | (0.46) | 3 | 9.67 |
| Evaluate | 0.00 | 1.00 | 0.10 | (0.30) | 6 | 1.67 |
| Total | 2.00 | 16.00 | 7.48 | (4.14) | 50 | 14.96 |

N=21

N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD"; "Mean Score Percentage (%)" are unweighted statistics.

Table 8.3 presents the mean score of 8 IL indicators of Science PA in special schools. Among the 7 dimensions, students in special schools also showed better performance in "define" and ''access''. The mean score for "define" was 2.95 (SD=2.09) and 1.90 (SD=1.64) for ''access'' and the mean score percentages for "define" and "access" were 32.78% and 31.67% respectively. Poor result was found in "evaluate" of which the mean score was 0.10 only and the mean score percentage was 1.67%. The maximum total score of the students in special schools only reached 16 out of 50. The total mean score was just 7.48 and the standard deviation was 4.14 in special schools. Besides, the standard deviations among the students in the special schools were smaller than those in the secondary schools in all the IL dimensions except the "define" dimension.

When comparing the results of students in the secondary and special schools, it was found that the secondary school students had better performance than the students in special schools.

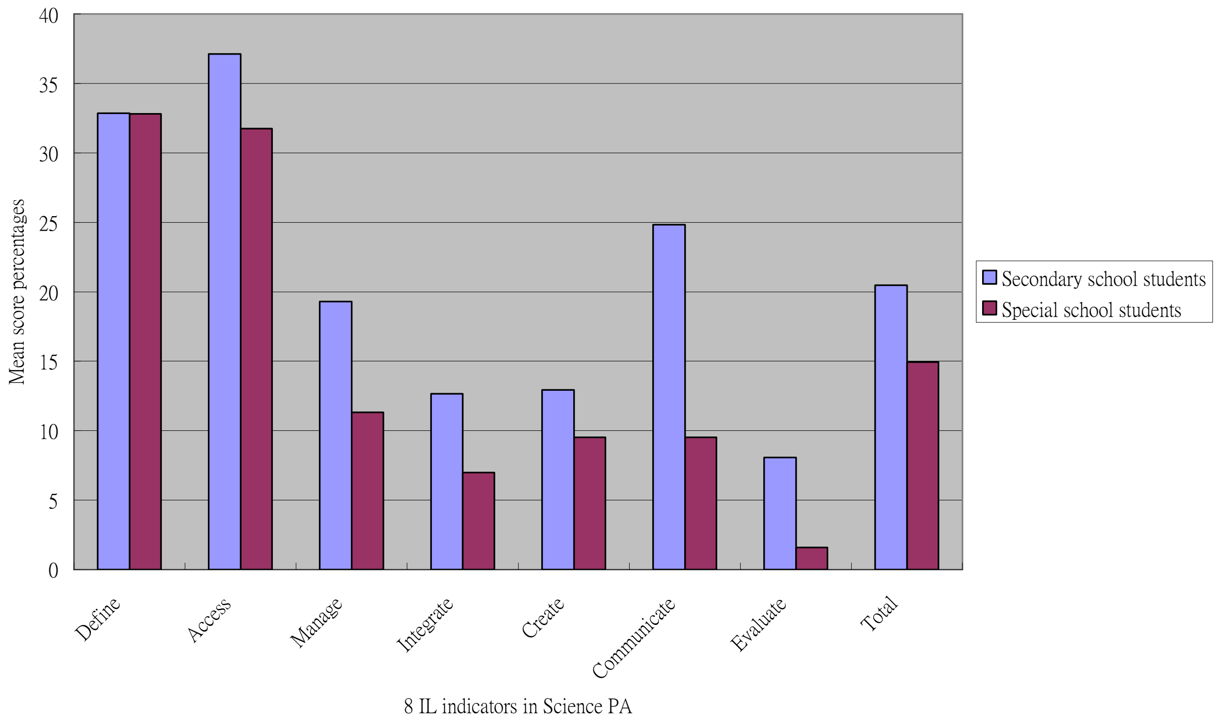



*Figure 8.3 Mean score percentages of secondary and special schools students in 8 IL indicators of Science PA*

## 8.4 Students' Performance at Item Level

In the following, an overview of students' performance will be reported first. Observations during the PA and the results of their scores will be presented next. Students' authentic work delineating levels of achievement will also be presented. Data used in this section were all weighted data for the students in secondary schools. Data from special schools were unweighted data.

### 8.4.1 An Overview

Tables 8.4 & 8.5 below show the mean score of each item in the secondary and special schools. For secondary schools, it was indicated in Table 8.4 that they had better performance in Q1.1 (Define), Q1.2 (Access), Q1.3 (Manage) and Q3.2 (Manage). The mean scores for these four questions were 1.26, 1.45, 0.39 and 0.49 respectively. The mean score percentages for these four questions were 42.00%, 48.33%, 39.00% and 49.00% respectively. Students' performance in Q6 (Integrate), Q7.1 (Integrate), Q7.2 (Integrate) and Q7.4 (Evaluate) were poor. The mean scores were 0.16, 0.18, 0.2 and 0.2 respectively. Their respective mean score percentages were 5.33%, 6.00%, 6.67% and 6.67%.

When looking at standard deviation, larger standard deviations ranging from 1.15 to 1.2 were found for Q1.2 (Access), Q3.1 (Manage) and Q5. In other words, the differences across students' performances in these three questions were large.

*Table 8.4 Secondary school students' mean score of each Science PA item*

| Question No. | IL Dimension | Min | Max | Mean Score | (SD) | Full Score | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| Q1.1 | Define | 0 | 3 | 1.26 | (0.95) | 3 | 42.00 |
| Q1.2 | Access | 0 | 3 | 1.45 | (1.16) | 3 | 48.33 |
| Q1.3 | Access | 0 | 3 | 0.78 | (1.05) | 3 | 26.00 |
| Q1.3 | Manage | 0 | 1 | 0.39 | (0.49) | 1 | 39.00 |
| Q2.1 | Define | 0 | 3 | 0.97 | (0.92) | 3 | 32.33 |
| Q2.2 | Define | 0 | 3 | 0.73 | (0.88) | 3 | 24.33 |
| Q3.1 | Manage | 0 | 6 | 0.66 | (1.15) | 6 | 11.00 |
| Q3.1 | Create | 0 | 3 | 0.39 | (0.67) | 3 | 13.00 |
| Q3.2 | Manage | 0 | 1 | 0.49 | (0.50) | 1 | 49.00 |
| Q4 | Integrate | 0 | 3 | 0.60 | (0.98) | 3 | 20.00 |
| Q5 | Integrate | 0 | 3 | 0.75 | (1.20) | 3 | 25.00 |
| Q6 | Integrate | 0 | 3 | 0.16 | (0.44) | 3 | 5.33 |
| Q7.1 | Integrate | 0 | 3 | 0.18 | (0.49) | 3 | 6.00 |
| Q7.2 | Integrate | 0 | 3 | 0.20 | (0.49) | 3 | 6.67 |
| Q7.3 | Evaluate | 0 | 3 | 0.28 | (0.61) | 3 | 9.33 |
| Q7.4 | Evaluate | 0 | 3 | 0.20 | (0.60) | 3 | 6.67 |
| Q7.4 | Communicate | 0 | 3 | 0.74 | (0.80) | 3 | 24.67 |

N=845

N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are weighted statistics.

*Table 8.5 Special school students' mean score of each Science PA item*

| Question No. | IL Dimension | Min | Max | Mean Score | (SD) | Full Score | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|---|
| Q1.1 | Define | 0 | 3 | 1.24 | (1.14) | 3 | 41.33 |
| Q1.2 | Access | 0 | 3 | 1.33 | (1.11) | 3 | 44.33 |
| Q1.3 | Access | 0 | 3 | 0.57 | (1.03) | 3 | 19.00 |
| Q1.3 | Manage | 0 | 1 | 0.19 | (0.40) | 1 | 19.00 |
| Q2.1 | Define | 0 | 3 | 1.10 | (1.04) | 3 | 36.67 |
| Q2.2 | Define | 0 | 3 | 0.62 | (0.92) | 3 | 20.67 |
| Q3.1 | Manage | 0 | 3 | 0.48 | (0.81) | 6 | 8.00 |
| Q3.1 | Create | 0 | 1 | 0.29 | (0.46) | 3 | 9.67 |
| Q3.2 | Manage | 0 | 1 | 0.24 | (0.44) | 1 | 24.00 |
| Q4 | Integrate | 0 | 3 | 0.38 | (0.92) | 3 | 12.67 |
| Q5 | Integrate | 0 | 3 | 0.48 | (1.08) | 3 | 16.00 |
| Q6 | Integrate | 0 | 1 | 0.05 | (0.22) | 3 | 1.67 |
| Q7.1 | Integrate | 0 | 1 | 0.10 | (0.30) | 3 | 3.33 |
| Q7.2 | Integrate | 0 | 1 | 0.05 | (0.22) | 3 | 1.67 |
| Q7.3 | Evaluate | 0 | 1 | 0.10 | (0.30) | 3 | 3.33 |
| Q7.4 | Evaluate | 0 | 1 | 0.00 | (0.00) | 3 | 0.00 |
| Q7.4 | Communicate | 0 | 1 | 0.29 | (0.46) | 3 | 9.67 |

N=21

N.B. - N listed in the table is the unweighted number of students.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are unweighted statistics.

Regarding the students' performance in special schools, the performances in Q1.1 (Define), Q1.2 (Access) and Q2.1 (Define) were better. Poorest performance was found in Q7.4 (Evaluate) of which the mean score was 0 but the full score was 3.

For Q3.1 (Manage), the full score was 6 and students could only score 3 marks as the highest marks. Q3.1 (Create) and Q6 to Q7, the full marks was 3 but students could only score at most 1 mark and none of them could get the full score.

As observed in Table 8.5, an interesting finding was that starting from Q6 though the score was relatively low; the standard deviation was very small. In other words, the differences among students' performances in Q6 and Q7 were small.

### 8.4.2 Students' Responses for Each Item

#### *8.4.2.1 Question 1*

Q1 included 3 sub-questions. Q1.1 asked the students to use appropriate keywords for information search. Table 8.6 below shows the students' performance in both secondary and special schools.

*Table 8.6 Percentage distribution of students of different school types for each score of Q1.1 of Science PA*

| School Type | N | Score (%) | | | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|---|---|
| | | .00 | 1.00 | 2.00 | 3.00 | | | |
| Secondary | 845 | 26.86 | 29.22 | 35.07 | 8.86 | 100.0 | 1.26 | (0.95) |
| Special | 21 | 28.57 | 42.86 | 4.76 | 23.81 | 100.0 | 1.24 | (1.14) |

N.B. - N listed in the table is the unweighted number of students.
"Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

In secondary schools, 26.86% of the students scored 0 mark, 29.22% got 1 mark and 35.07% scored 2 marks. Only 8.86% of the students scored 3 marks. Less than 50% attained the proficient level in terms of using ICT tools to identify and appropriately represent the information needed.

For special schools, 28.57% of the students scored 0 mark, the majority (42.86%) scored 1 mark and 4.76% scored 2 marks. A much higher percentage of students (23.81%) scored 3 marks when compared with that of the secondary schools.

In general, it was observed that most of the students in both secondary and special schools just used the self-guided map for their first search and missed out the key term "Kadoorie farm" in their search. An interesting finding was also observed in this item. For some students in the secondary schools, they did not use any search engine directly for information searching but posted the question in "Yahoo Knowledge". Figure 8.4 below shows the question posted by the students and responses given by others within the assessment period.


*Figure 8.4 Students' work on information search by posting the questions on "Yahoo Knowledge"*

Below are some examples of students' answers for Q1.1 of Science PA.

| | |
|---|---|
| Novice level (0 mark)<br>• Cannot identify what information is needed. | • 迪士尼 (Student: 301002)<br>• 生態徑導-香港天水圍濕地公園 (Student: 213009) |
| Basic level (1 mark)<br>• The search item is too general. | • 生態徑導遊圖 (Student: 214034) |
| Proficient level (2 marks)<br>• The search item is on topic but too general or specific. | • Kadoorie Farm 'Nature Walk Self-guided Map' (Student: 210037) |
| Advanced level (3 marks)<br>• The search items are focused and specific. | • Kadoorie Farm (Student: 212037)<br>• Kadoorie Farm Map (Student: 219035) |

*Table 8.7 Percentage distribution of students of different school types for each score of Q1.2 of Science PA*

| School Type | N | Score (%) | | | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|---|---|
| | | .00 | 1.00 | 2.00 | 3.00 | | | |
| Secondary | 845 | 28.69 | 23.13 | 22.41 | 25.77 | 100.0 | 1.45 | (1.16) |
| Special | 21 | 23.81 | 42.86 | 9.52 | 23.81 | 100.0 | 1.33 | (1.11) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Q1.2 was to retrieve appropriate information from the web. The percentage distribution in the secondary schools of the 4 levels was similar with the range of 22.41% to 28.69%. Data from students' responses indicated that an overwhelming number of students were not able to get a direct link for this question. They just wrote down the webpage which showed some related information.

For students in special schools, the majority of them (42.86%) scored 1 mark. Only 9.52% of the students scored 2 marks. About 24 % of them scored 0 and 3 marks.

Here are some students' examples at each level of the "access" dimension.

| | |
|---|---|
| Novice level (0 mark)<br>• URL directed to irrelevant content. | Uniform Resource Locator (URL) is a technical, Web-related term used in two distinct meanings (Student: 201004)<br>http://www.papago.idv.tw/schedule/wutai/x14.JPG (Student: 202007) |
| Basic level (1 mark)<br>• URL for access to a webpage with related content – nature walk. | http://www.greengarden.com.hk/eduction/map.gif (Student: 202001)<br>http://www.fauntleroy.net/creek/activities/naturewalk.pdf (Student: 207004) |
| Proficient level (2 marks)<br>• URL(s) for access to webpage with related content – Kadoorie Farm. | http://www.hkoutdoors.com/new-territories/kadoorie-farm.html (Student: 204030<br>http://www.greengarden.com.hk/kfbc/d2c-map-big.jpg (Student: 220038) |
| Advanced level (3 marks)<br>• URL for access to appropriate content webpage. | http://www.kfbg.org.hk/ (Student: 302002)<br>http://ilpa.cite.hku.hk/modules/news2/resources/nature%20walk%20map.html (Student: 220013) |

*Table 8.8 Percentage distribution of students of different school types for each score of Q1.3 (Access) of Science PA*

| **School Type** | **N** | **Score (%)** .00 | 1.00 | 2.00 | 3.00 | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|---|---|
| Secondary | 845 | 61.76 | 6.20 | 24.80 | 7.24 | 100.0 | 0.78 | (1.05) |
| Special | 21 | 71.43 | 9.52 | 9.52 | 9.52 | 100.0 | 0.57 | (1.03) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

In Q1.3, students were asked to download the relevant information. In general, Q1.3(Access) was poorly answered by both the secondary and special school students. As indicated in Table 8.8, more than half of the students in the secondary schools received 0 mark. Many students taking the English version of the PA even attached documents instead of maps. For students taking the Chinese version, quite a portion of them misunderstood the question in which the students were asked to find the 'nature walk self-guided map (生態徑導遊圖)'. However, they interpreted 'nature walk self-guided map' as a picture of the tour-guide and downloaded the respective picture as their answer. As a result, more than half of the students scored 0 mark. 6.20% got 1 mark, 24.80% got 2 marks and only 7.24% got 3 marks.

For the students in special schools, 71.43% of them scored 0 mark. Most of them did not download anything that was related to the topic. Only around 30% of the students downloaded something related to the topic.

It was interesting to find out that 29 students from the secondary schools and 1 student from a special school were able to download the correct map by using the related link in the next assessment question.

Samples of students' work are shown below.

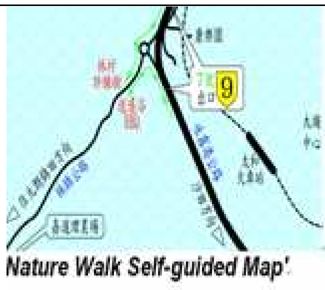
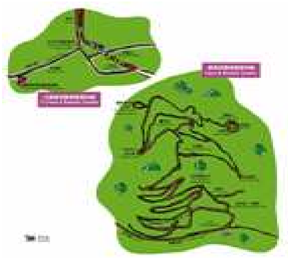
| | | |
|---|---|---|
| Novice level (0 mark)<br>• Nothing has been downloaded / irrelevant information / not a map. | <br>(Student 215005) | |
| Basic level (1 mark)<br>• Able to download a map related to nature walk. | <br>(Student: 203039) | <br>(Student: 301006) |
| Proficient level (2 marks)<br>• Able to download a related map. | <br>(Student: 303014) | <br>(Student: 213027) |
| Advanced level (3 marks)<br>• Able to download the correct map. | <br>(Student: 201005) | |

*Table 8.9 Percentage distribution of students of different school types for each score of Q1.3 (Manage) of Science PA*

| School Type | N | Score (%) | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|
| | | .00 | 1.00 | | | |
| Secondary | 845 | 60.58 | 39.42 | 100.0 | 0.39 | (0.49) |
| Special | 21 | 80.95 | 19.05 | 100.0 | 0.19 | (0.40) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Table 8.9 indicated that 39.42% of the secondary school students and 19.05% of the special school students were able to save their works into "My Documents" folder with the name "Nature Walk Self-guided map".

Looking at both Q1.2 and Q1.3, it was discovered that students were able to locate information but had problems in retrieving appropriate information.

#### *8.4.2.2 Question 2*

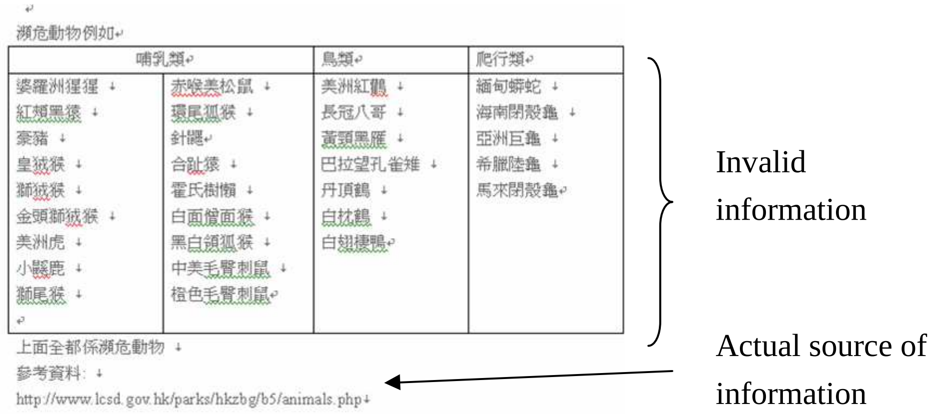
*Table 8.10 Percentage distribution of students of different school types for each score of Q2.1 of Science PA*

| School Type | N | Score (%) | | | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|---|---|
| | | .00 | 1.00 | 2.00 | 3.00 | | | |
| Secondary | 845 | 43.70 | 16.01 | 39.89 | 0.41 | 100.0 | 0.97 | (0.92) |
| Special | 21 | 42.86 | 9.52 | 42.86 | 4.76 | 100.0 | 1.10 | (1.04) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Q2 was divided into two parts. For Q2.1, students were asked to identify endangered species among 9 animals and plants and for Q2.2, students were asked to find out the suitable habitat for the endangered species found. Table 8.10 shows the percentage of students in each score of Q2.1. Generally speaking, students in both secondary and special schools could identify at least one endangered species for Q2.1 but only a handful of them managed to give a complete answer to Q2.2 (see Table 8.11). Again, it was observed that some secondary school students used "Yahoo Knowledge" to search the information for this question and they just simply read the information provided by others without referring and tracing the actual source(s) of information. This indicated that the capability of judging the accuracy of digital information was still rather weak at the S2 level.

Figure 8.5 shows the invalid information that students retrieved from "Yahoo Knowledge".




瀕危動物例如

| 哺乳類 | | 鳥類 | 爬行類 |
|---|---|---|---|
| 婆羅洲猩猩 | 赤喉美松鼠 | 美洲紅鸛 | 緬甸蟒蛇 |
| 紅頰黑猿 | 環尾狐猴 | 長冠八哥 | 海南閉殼龜 |
| 豪豬 | 針鼴 | 黃頸黑雁 | 亞洲巨龜 |
| 皇狨猴 | 合趾猿 | 巴拉望孔雀雉 | 希臘陸龜 |
| 獅狨猴 | 霍氏樹懶 | 丹頂鶴 | 馬來閉殼龜 |
| 金頭獅狨猴 | 白面僧面猴 | 白枕鶴 | |
| 美洲虎 | 黑白領狐猴 | 白翅棲鴨 | |
| 小鼷鹿 | 中美毛臀刺鼠 | | |
| 獅尾猴 | 橙色毛臀刺鼠 | | |

上面全都係瀕危動物

參考資料：

http://www.lcsd.gov.hk/parks/hkzbg/b5/animals.php

*Figure 8.5 Students' information search of invalid information in "Yahoo Knowledge"*

Besides, it was found out that for those weaker students in both secondary and special schools, they did not read the question carefully and just put in the answers like 'Chinese White Dolphins' and 'Blue Whales' which were not even one of the choices available in the question. Excluding those scoring 0 mark, the majority of the students reached the proficient level and 39.89% of students scored 2 marks and only a tiny portion (0.41%) scored 3 marks in the secondary schools.

Some examples of students' work are illustrated below.

| | |
|---|---|
| Novice level (0 mark)<br>• Cannot find the endangered species / answer is missing / other endangered species not related to the question / able to find the endangered species together with more than two pieces of irrelevant stuff. | • Golden Agouti (Student: 201004)<br>• 蓝鲸 (Student: 202011) |
| Basic level (1 mark)<br>• Able to find one / two endangered species together with less than two pieces of irrelevant stuff. | • 蘇鐵,盧文樹蛙 (Student: 202033)<br>• Romer's Tree Frog 2. Grantham's Camellia (Student: 204005) |
| Proficient level (2 marks)<br>• Able to find the two endangered species together with one piece of irrelevant stuff / able to find one endangered species. | • Romer's Tree Frog (Student: 203014)<br>• Cuora Galbinifrons (Student: 212005) |
| Advanced level (3 marks)<br>• Able to find the two endangered species. | • 盧文樹蛙、海南閉殼龜 (Student: 303014) |

*Table 8.11 Percentage distribution of students of different school types for each score of Q2.2 of Science PA*

| School Type | N | Score (%) | | | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|---|---|
| | | .00 | 1.00 | 2.00 | 3.00 | | | |
| Secondary | 845 | 47.09 | 42.33 | 1.25 | 9.33 | 100.0 | 0.73 | (0.88) |
| Special | 21 | 57.14 | 33.33 | 0.00 | 9.52 | 100.0 | 0.62 | (0.92) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

For Q2.2, some secondary school students who used English as the medium of instruction did not seem to understand the meaning of the word 'habitat' and came up with bizarre answers. However, it was also observed that some were able to use Internet dictionary to find out the meaning during the assessment. In general, a concrete description of the habitat was often lacking in both secondary and special schools. 42.33% of the students in the secondary schools and 33.33% of the students in the special schools scored 1 mark as they gave answers like 'forest', 'wetland' or 'Ngong Ping' and some just simply copied and pasted information from the web. They failed to screen the information obtained and check if it was relevant or not. Only a small proportion of the students (9.33% of students in the secondary schools and 9.52% of students in the special schools) successfully scored all 3 points, i.e. at the advanced level, while the majority of them (47.09% in the secondary schools and 57.14% in the special schools) provided irrelevant answers.

| | |
|---|---|
| Novice level (0 mark)<br>• Inaccurate answer. | • 一大堆一齊住 (Student: 213031)<br>• 公園的東面部份稱爲舊公園，設有兒童遊樂場、鳥舍、美洲虎籠、溫室及噴水池平台花園。西面部份是新公園，主要是哺乳類及爬行類動 (Student: 213006) |
| Basic level (1 mark)<br>• Able to name the place. | • Forest (Student: 201012)<br>• 樹林 濕地 (Student: 202006) |
| Proficient level (2 marks)<br>• Able to find appropriate information together with some irrelevant stuff. | • The habitat of the frog is well-wooded areas near a small stream or other water source suitable for breeding. The creature usually sits on low bushes, buries itself in fallen leaves, or rests on bare ground. The frog has been the outlying islands in Hong Kong, namely Lantau Island, Lamma Island, Po Toi Island and Chek Lap Kok. (Student: 209013)<br>• 盧文樹蛙: 生境通常是一些附近的小河或其他水源的林地。 海南閉殼龜: 茂密的高林地及樹林 葛量洪茶: 山上 (Student: 217003) |
| Advanced level (3 marks)<br>• Able to describe some suitable habitats. | • Its habitat is usually well-wooded areas near a small stream or other water sources suitable for breeding. (Student: 203041)<br>• 牠們的生境通常是一些附近的小河或其他水源的林地。(Student: 214026) |

#### *8.4.2.3 Question 3*

*Table 8.12 Percentage distribution of students of different school types for each score of Q3.1 (Manage) of Science PA*

| **School Type** | **N** | **Score (%)** | | | | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | .00 | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | | | |
| Secondary | 845 | 68.16 | 12.48 | 9.29 | 7.18 | 1.94 | 0.50 | 0.46 | 100.0 | 0.66 | (1.15) |
| Special | 21 | 66.67 | 23.81 | 4.76 | 4.76 | 0.00 | 0.00 | 0.00 | 100.0 | 0.48 | (0.81) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Categorization was a major task in Q3. In Q3.1, students were asked to classify 9 species into 4 categories. For each category, they were required to include both names and photos into the chart and to show references which had been made to the existing setting in the Kardoorie Farm.

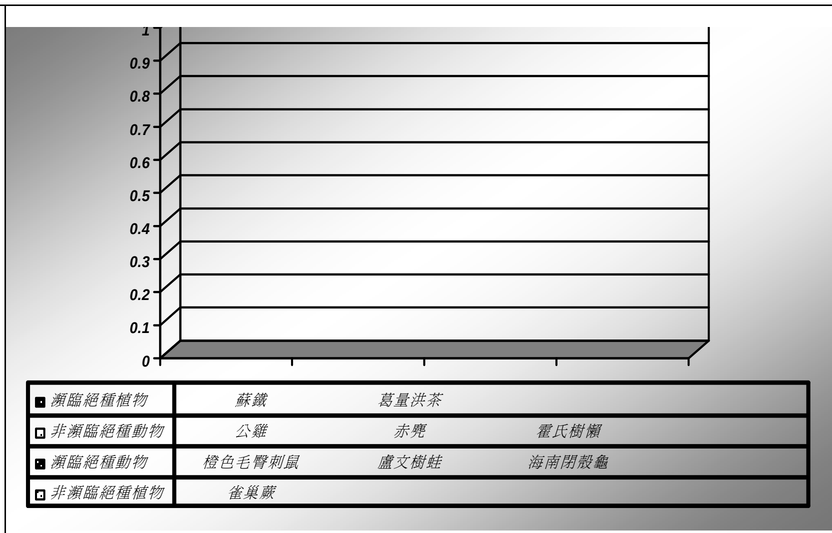
In general, both students in the secondary and special schools performed poorly in Q3 as shown in Table 8.12. The full score of Q3.1 was 6 marks. The majority of the students (97.11%) in the secondary schools scored 3 marks or below in Q3.1. Only a tiny portion of the secondary school students (2.90%) were able to score 4 marks or above in this question. The majority only achieved the novice level.

The results in the special schools were even worse. All the students scored under 4 marks. The majority of them scored 0 mark. Only a tiny portion of students (less than 10%) scored 2 to 3 marks.

The original time allocation for this question was 12 minutes. Most of the students in both secondary and special schools took far more time (i.e. about 15 to 20 minutes) to finish this question. Some even took half an hour to complete this question.

Only a few of the students in both secondary and special schools took notice of the necessity to make reference to the Kadoorie Farm when classifying the organism. Careful examination of the question was neglected by most of the students in both secondary and special schools. Most students directly did a biological classification of the organisms. The categories were usually 'Mammals', "Reptiles', 'Plants' and 'Birds'. Others gave answers like 'Flowering plants vs non-flowering plants', 'Poultry vs wild animals', and 'Vertebrates vs invertebrates'. Even weaker students simply put the organisms into groups without naming those groups.

Below are the samples of student work.

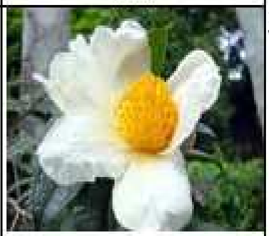
| Novice level (0 mark)<br>• Cannot classify the newcomers<br>• Information is missing or able to identify several categories with titles however four or above pieces of information are missing/wrong | |
|---|---|
| <br>(Student: 207011) | <br>(Student: 302001) |

Basic level (1 mark)

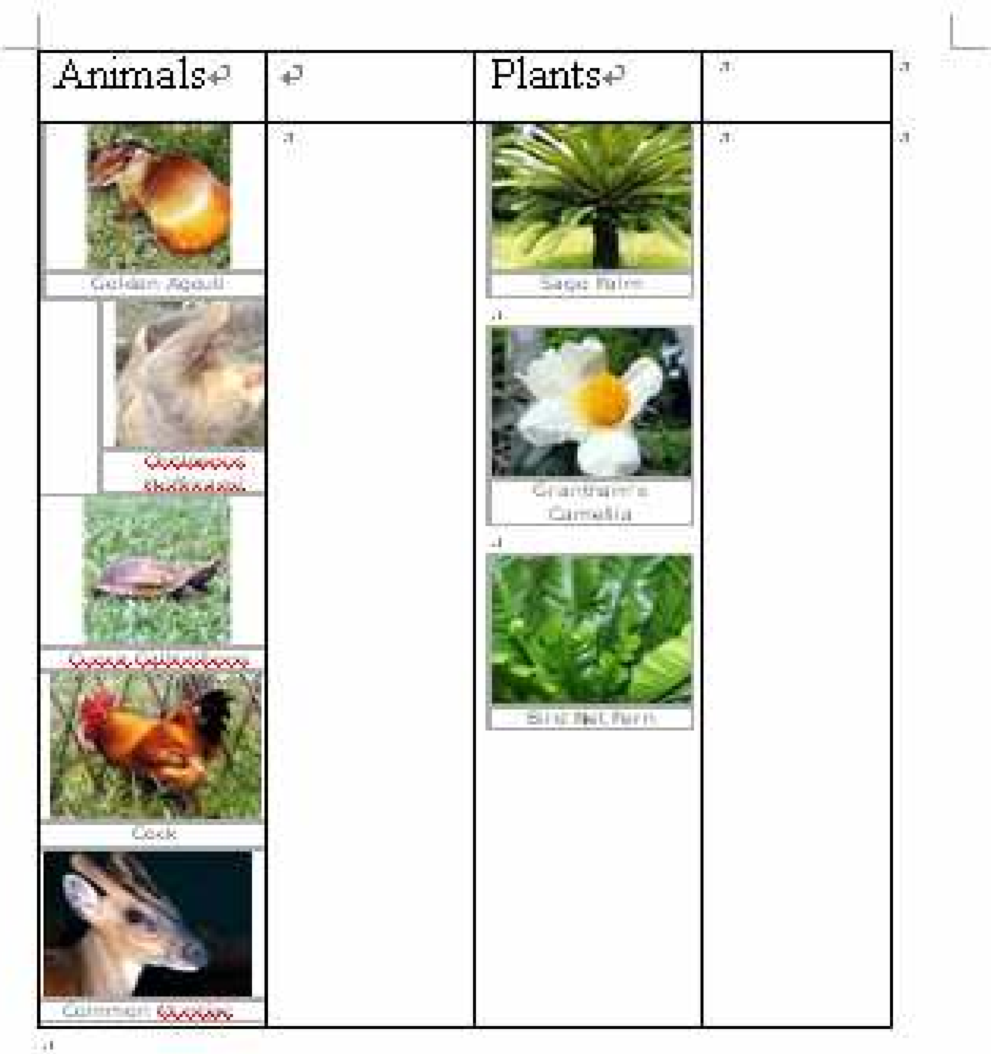
- Able to identify several categories with titles.
- Able to classify the newcomers into existing categories with images or names but the classification might have two or three pieces of missing or wrong information.

| | | | |
|---|---|---|---|
| 植物: | 蘇鐵  | 雀巢蕨  | 葛量洪茶  |
| 爬行類動物: | 盧文樹蛙  | 橙色毛臂刺鼠  | 海南閉殼龜  |
| 鳥類: | [illegible]  | 公雞  | |
| 哺乳類動物: | 赤麂  | | |

(Student: 233033)

| 兩棲類 | 爬行類 | 哺乳類 | 植物類 |
|---|---|---|---|
|  盧文樹蛙 |  海南閉殼龜 |  赤麂 | |
| |  公雞 |  霍氏樹懶 |  蘇鐵 |
| | | |  |

(Student 217010)

| |
|---|
| Basic level (2 marks)<br>• Able to identify several categories with titles.<br>• Able to classify the newcomers into existing categories with images and names but the classification might have one piece of missing or two pieces of wrong information. |
| <br><br>(Student 203012) |

plants: Sago Palm, Grantham's Camellia, Bird Net Fern

reptile : Romer's Tree Frog, Cuora Galbinifrons,

mammal: Common Muntjac, Choloepus Hoffmanni

birds: Cock, Golden Agouti

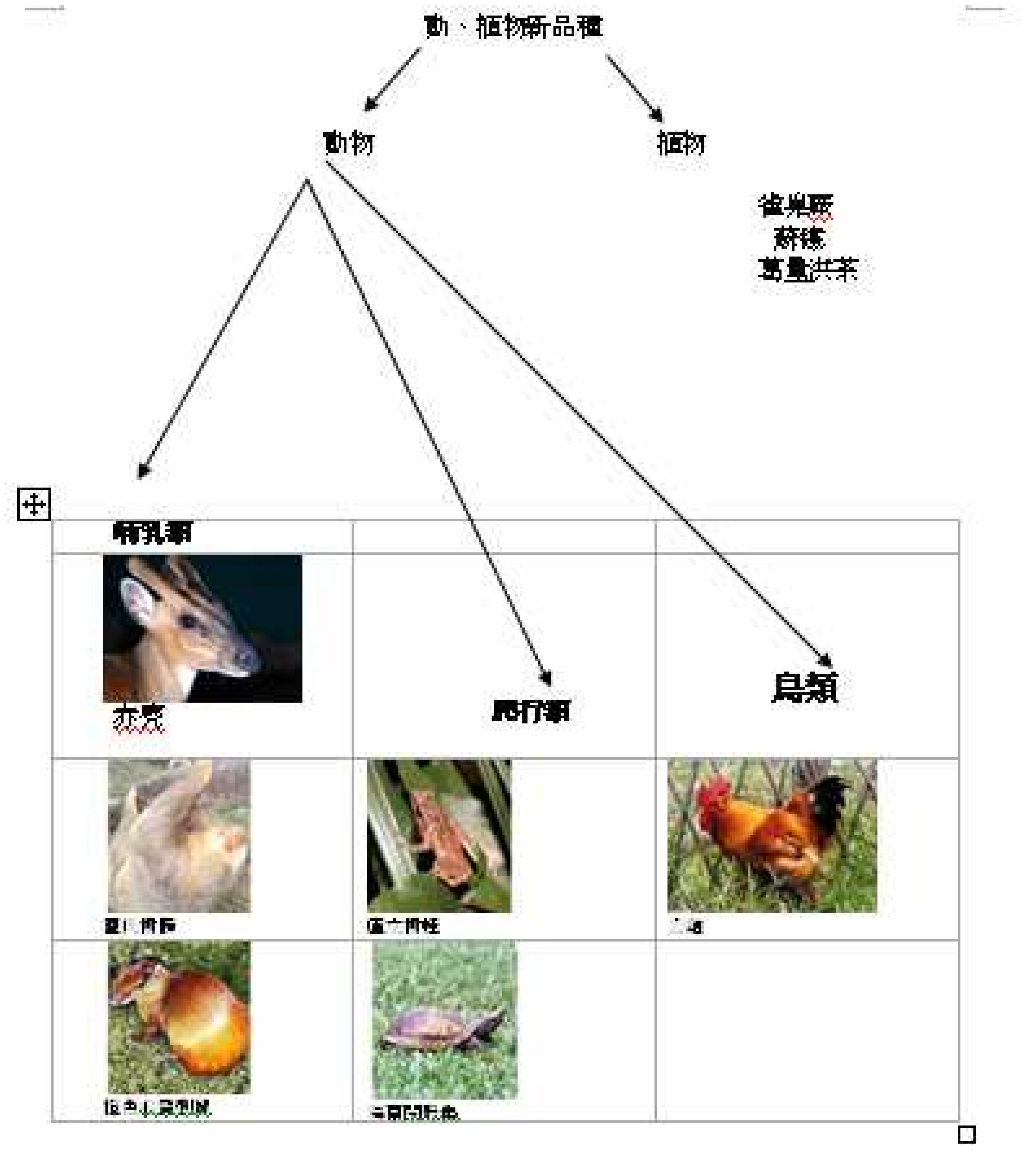
(Student: 209004)

Proficient level (3 marks)

- Able to identify four categories with titles but does not make reference to the existing setting in the Kardoorie Farm.
- Able to classify the newcomers into suitable categories with images or names but the classification might have one piece of missing or wrong information.

| 種類 | 哺乳類動物 | 兩棲類動物 | 鳥類 | 植物 |
|---|---|---|---|---|
| 赤麂 | √ | | | |
| 公雞 | | | √ | |
| 海南閉殼龜 | | √ | | |
| 蘇鐵 | | | | √ |
| 盧文樹蛙 | | √ | | |
| 霍氏樹懶 | √ | | | |
| 葛量洪茶 | | | | √ |
| 雀巢蕨 | | | | √ |
| 橙色毛臂刺鼠 | √ | | | |

(Student: 222032)

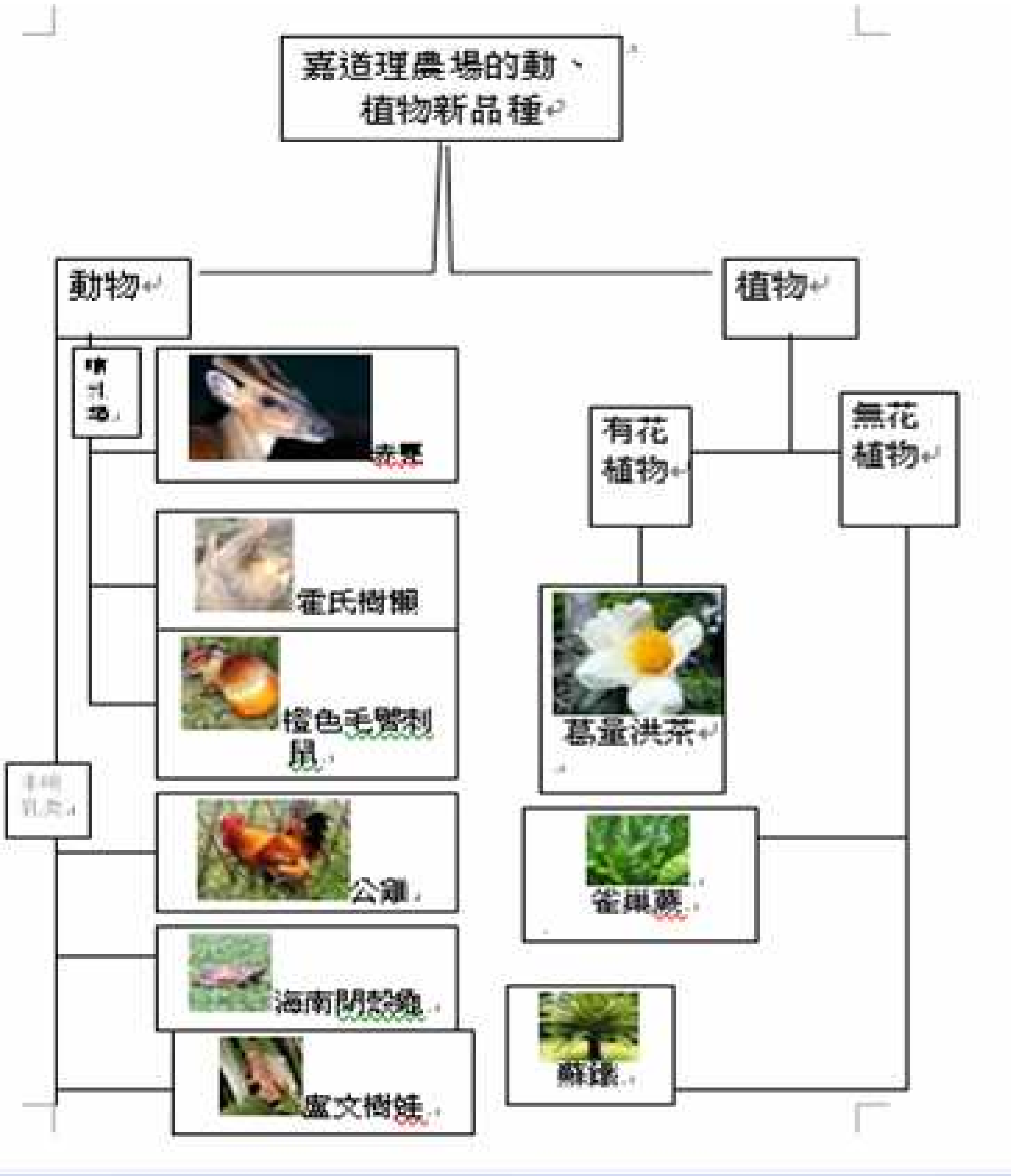



(Student: 223029)

Proficient level (4 marks)

- Able to identify four categories with titles but does not make reference to the existing setting in the Kardoorie Farm.
- Able to classify the newcomers into suitable categories with images and names.

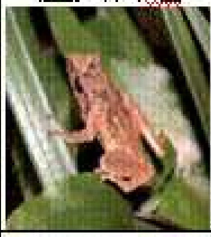

(Student: 214009)




(Student: 223031)

Advanced level (5 marks)

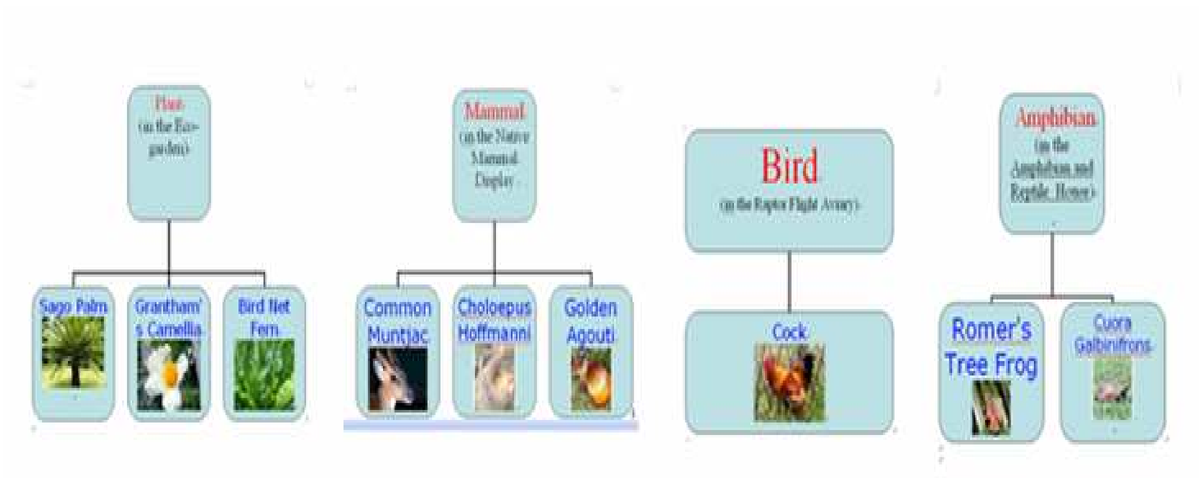
- Able to identify four categories with titles.
- Able to classify the newcomers into suitable categories with images and names but with one mistake / piece of missing information in classifying newcomers.
- Able to show references which have been made to the existing setting in the Kardoorie Farm.

| 雞舍 | 動物拯救中心 | 葛先生紀念花園 | 蕨類植物小徑 |
|---|---|---|---|
| 公雞  | 盧文樹蛙  | 葛量洪茶  | 雀巢蕨  |
| | 赤麂 | | 蘇鐵  |
| | 霍氏樹懶 | | |
| | 橙色毛臀刺鼠 | | |
| | 海南閉殼龜 | | |

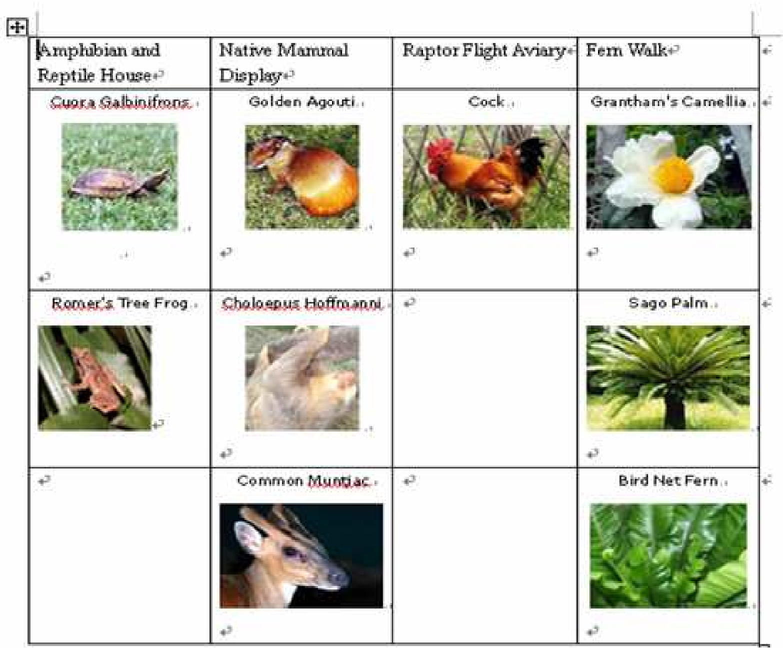
(Student: 223002)

Advanced level (6 marks)

- Able to identify four categories with titles.
- Able to classify the newcomers into suitable categories with images and names.
- Able to show references which have been made to the existing setting in the Kardoorie Farm.




(Student: 203041)



| Amphibian and Reptile House | Native Mammal Display | Raptor Flight Aviary | Fern Walk |
|---|---|---|---|
| Cuora Galbinifrons | Golden Agouti | Cock | Grantham's Camellia |
| Romer's Tree Frog | Choloepus Hoffmanni | | Sago Palm |
| | Common Muntjac | | Bird Net Fern |

(Student 204008)

Q3.1 was also related to the construction of a diagram. Students were required to use electronic resources to create a classification chart. Table 8.13 indicated the results of students' performance. As shown in Table 8.13, the construction of diagram was also poorly performed. In secondary schools, less than 6% of the students scored 2 marks or above. 68.99% scored 0 mark and 25.83% scored 1 mark. That means most of the students achieved the novice level.

For students in the special schools, the majority of them scored 0 mark. Only 28.57% scored 1 mark and none of them scored 2 marks or above.

Results of students' work indicated that both students in secondary and special schools were able to use Excel or a table to construct the classification diagram with simple structure. Only 2.58% of the students in the secondary schools could create a diagram with at least 2 levels of hierarchical structure and scored 3 marks as a result. It was interesting to note that most of the students associated the classification chart with the creation of a bar chart in Excel.

*Table 8.13 Percentage distribution of students of different school types for each score of Q3.1 (Create) of Science PA*

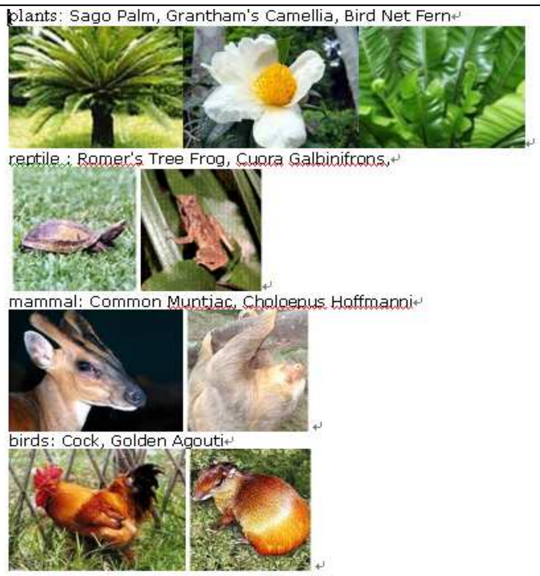
| **School Type** | **N** | **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|---|---|
| | | 0.00 | 1.00 | 2.00 | 3.00 | | | |
| Secondary | 845 | 68.99 | 25.83 | 2.60 | 2.58 | 100.0 | 0.39 | (0.67) |
| Special | 21 | 71.43 | 28.57 | 0.00 | 0.00 | 100.0 | 0.29 | (0.46) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Samples of students' work are illustrated below.

Novice level (0 mark)

- Unable to create a classification chart.



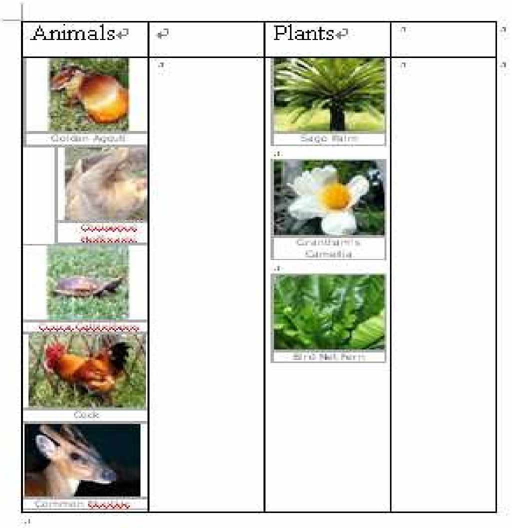

(Student 209004)

1.Bird Net Fern
Sago Palm
2.Golden Agout
Common Muntiac
Choloepus Hoffmanni
3. Romer's Tree Frog
Cuora Galbinifrons
cock
4. Grantham's Camellia

(Student 21903)

Basic level (1 mark)

- Able to use a simple tool (table) to create a classification table.



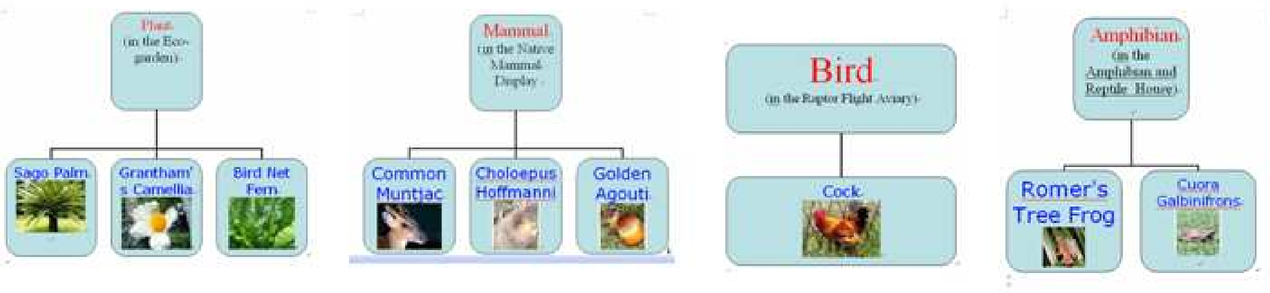

(Student: 203012)

| | |
|---|---|
| 赤麂 | Native Mammal Display |
| 公雞 | Raptor Flight Aviary |
| 海南閉殼龜 | Streamlife Display |
| 蘇鐵 | Kwun Yum Garden |
| 盧文樹蛙 | Amphibian and Reptile House |
| 霍氏樹懶 | Native Mammal Display |
| 葛量洪茶 | Kwun Yum Garden |
| 雀巢蕨 | Kwun Yum Garden |
| 橙色毛臀刺鼠 | Native Mammal Display |

(Student: 222010)

Proficient level (2 marks)

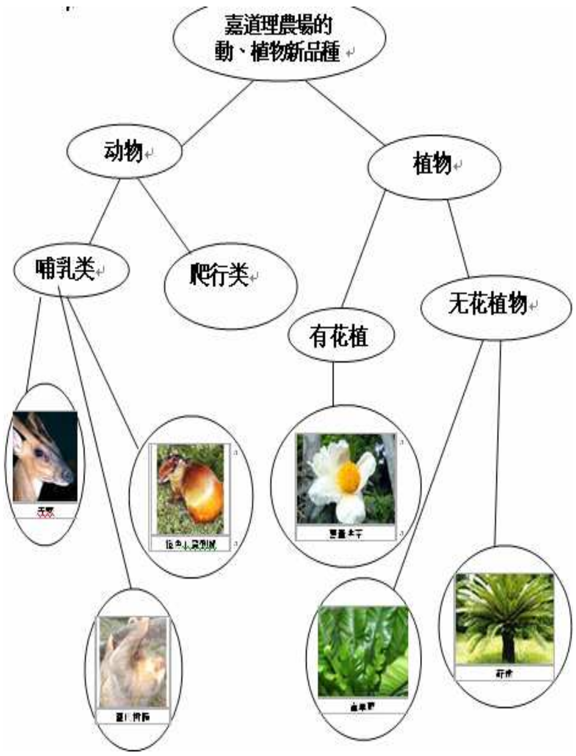
- Able to use an advanced tool (diagram function or other drawing tool) to create a chart with 1 level of hierarchical structure.



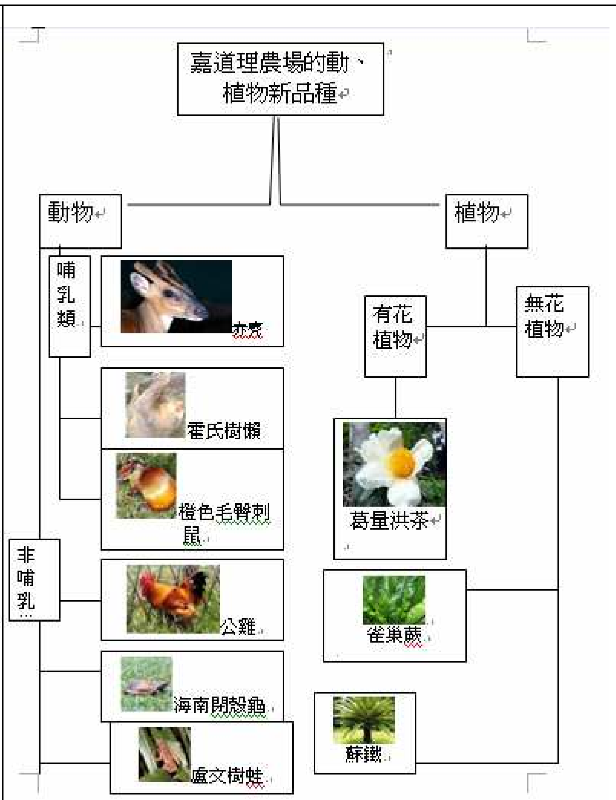

(Student 203041)

Advanced level (3 marks)

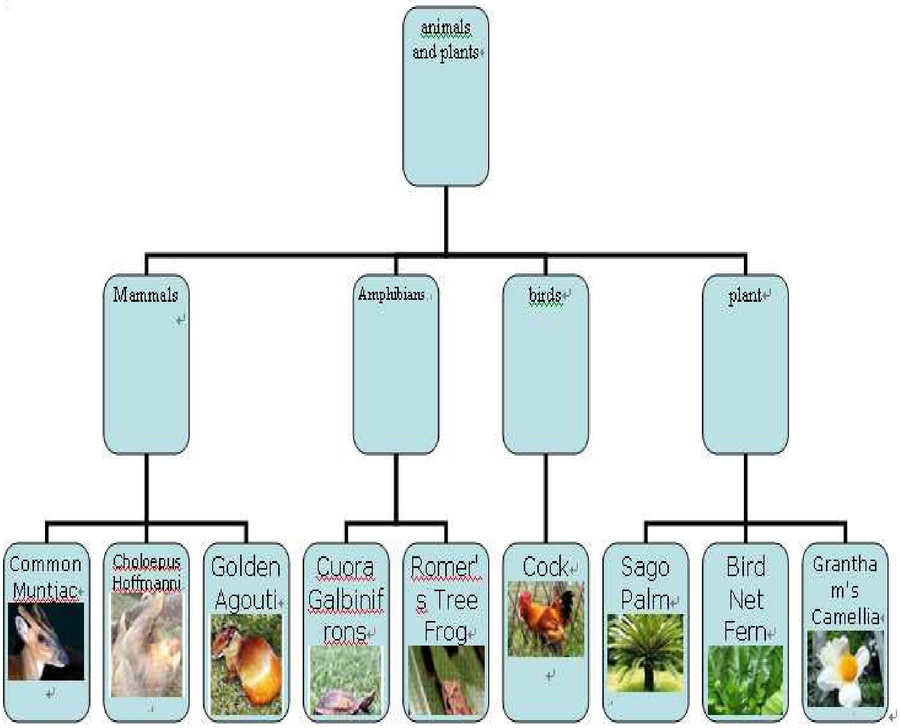
Able to use an advanced tool (diagram function, Excel or other drawing tool) to create a chart with at least 2 levels of hierarchical structure.




(Student: 209009)




(Student: 223031)




(Student: 223030)

In Q3.2, students were asked to save the created diagram into an appropriate folder. Table 8.14 indicates the results of students' performance. 49.28% of the students in secondary schools were able to save the required file under "My Documents". A little bit progress could be seen when compared with Q1.3 (Manage) (only 39.42% were able to do so). For students in the special schools, only 23.81% of the students were able to save the diagram. The low percentage might be due to the fact that most of the students could not create a classification diagram.

*Table 8.14 Percentage distribution of students of different school types for each score of Q3.2 of Science PA*

| **School Type** | **N** | **Score (%)** | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|
| | | 0.00 | 1.00 | | | |
| Secondary | 845 | 50.72 | 49.28 | 100.0 | 0.49 | (0.50) |
| Special | 21 | 76.19 | 23.81 | 100.0 | 0.24 | (0.44) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

#### *8.4.2.4 Question 4*

Starting from Q4 onwards, there was a simulation programme on ecology. In Q4, students were asked to operate the simulation programme according to the instruction given and interpret information from the simulation programme.

*Table 8.15 Percentage distribution of students of different school types for each score of Q4 of Science PA*

| **School Type** | **N** | **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|---|---|
| | | 0.00 | 1.00 | 2.00 | 3.00 | | | |
| Secondary | 845 | 64.66 | 21.58 | 2.37 | 11.39 | 100.0 | 0.60 | (0.98) |
| Special | 21 | 80.95 | 9.52 | 0.00 | 9.52 | 100.0 | 0.38 | (0.92) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

It was observed that most of the students counted the number of fish and ducks by looking at the figure grid and counted the number one by one. Only a few of them were able to use the graph to figure out the number at the beginning. As a result, most of the students in both secondary schools and special schools got 0 mark as they could not use an appropriate counting method to find out the number of shrimps.

Samples of students' work are illustrated below.

| | |
|---|---|
| Novice level (0 mark)<br>• Inaccurate data. | • 鴨子和魚不斷增加 (Student: 222025)<br>• 由多變少 (Student: 303013) |
| Basic level (1 mark)<br>• 1-2 accurate pieces of information with clear / loose presentation. | • 魚 74 (Student: 221010) |
| Proficient level (2 marks)<br>• 3 accurate pieces of information with loose presentation. | • 70, 505, 31 (Student: 219006)<br>• 80, 480, 40 (Student: 234041) |
| Advanced level (3 marks)<br>• 3 accurate pieces of information with clear presentation. | • fish-70, ducks-35, shrimp-500 (Student: 219003)<br>• 魚 80 條, 蝦 480 隻, 鴨 40 隻 (Student: 304001) |

### *8.4.2.5 Question 5*

*Table 8.16 Percentage distribution of students of different school types for each score of Q5 of Science PA*

| **School Type** | **N** | **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|---|---|
| | | 0.00 | 1.00 | 2.00 | 3.00 | | | |
| Secondary | 845 | 67.16 | 10.04 | 3.11 | 19.70 | 100.0 | 0.75 | (1.20) |
| Special | 21 | 80.95 | 4.76 | 0.00 | 14.29 | 100.0 | 0.48 | (1.08) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

Similar to Q4, students were asked to operate the simulation programme and interpret the information from the simulation programme in Q5.

Slightly higher percentages of the secondary (Q5: 19.70%; Q4: 11.39%) and special (Q5: 14.29%; Q4: 9.52%) school students got 3 marks when compared with Q4. It was also reported that during the assessment, more students used the graph to figure out the number rather than counting the living things one by one in this question.

Samples of students' work are illustrated below.

| | |
|---|---|
| Novice level (0 mark)<br>• Inaccurate data. | • fish ate shrimp (Student: 234034)<br>• 全部都有增長 (Student: 231005)<br>• 429 (Student: 303014) |
| Basic level (1 mark)<br>• 1-2 accurate pieces of information with clear / loose presentation. | • 魚:70, 蝦:100 (Student: 202007)<br>• 魚:80, 蝦:70, 鴨:80 (Student: 233013) |
| Proficient level (2 marks)<br>• 3 accurate pieces of information with loose presentation. | • 60, 500, 40 (Student: 234011) |

| | |
|---|---|
| Advanced level (3 marks)<br>• 3 accurate pieces of information with clear presentation. | • 魚=78, 蝦=489, 鴨=40 (Student: 231030) |

### *8.4.2.6 Question 6*

*Table 8.17 Percentage distribution of students of different school types for each score of Q6 of Science PA*

| School Type | N | Score (%) | | | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|---|---|
| | | 0.00 | 1.00 | 2.00 | 3.00 | | | |
| Secondary | 845 | 86.91 | 10.84 | 1.85 | 0.41 | 100.0 | 0.16 | (0.44) |
| Special | 21 | 95.24 | 4.76 | 0.00 | 0.00 | 100 | 0.05 | (0.22) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

In Q6, students' explanations and interpretation for the phenomena observed in the simulation were expected. In general, most students in both secondary and special schools were not able to describe their observations in the ecosystem and explain the population changes. It was also observed that for students at the novice level in both secondary and special schools gave answers that were irrelevant to the conditions presented in the simulation. They were only able to resort to their daily-life experience when explaining the changes.

Samples of students' work are presented below.

| | |
|---|---|
| Novice level (0 mark)<br>• Wrongly describe the changes in populations of different species.<br>• Incorrect reasons for the population changes. | • 因爲池塘愈來愈少,加上人類一直捕捉家禽。(Student: 202015)<br>• 幾種動物愈黎愈少，因爲我們人類每天也會食牠們，物們也少生產 ，所以是每天每天減少 (Student: 302010) |
| Basic level (1 mark)<br>• Describe the changes in populations of different species with minor flaw(s).<br>• Give correct reasons for the population changes. | • 我得觀察是魚,蝦,鴨的數量都比之前增加了。因爲牠們都在生長(Student: 213004)<br>• 因爲池塘裏的生物會吃掉其他生物，而生物又會繁殖 (Student: 214030) |
| Proficient level (2 marks)<br>• Describe the changes in populations of different species.<br>• Give correct reasons for the population changes.<br>• Able to explore the rules that governed the simulation programme. | • '蝦的數量不斷上升,而鴨的數量不定，但魚的數量不斷下降，因爲魚比較易死' (Student: 216013)<br>• The number of ducks haven't changed greatly. Although there reproduce rate is 6%, however, no one eat them for food. Only ducks will eat fish, however, the number of ducks is less than fish, so the number of fish has only changed a little. (Student: 234012) |

| | |
|---|---|
| Advanced level (3 marks)<br>• Describe fluctuation of the graph.<br>• Describe relationship between the fluctuation of different species.<br>• Describe the changes in populations of different species.<br>• Give correct reasons for the population changes. | • 鴨的數量沒有大幅改變，魚的數量沒有大幅改變，蝦的數量沒有大幅改變，因爲鴨食魚，魚食蝦，蝦食水草，不斷循環。(Student: 223012)<br>• 魚和鴨子的數量一直都沒有明顯變化，而蝦就有比較大的波幅，因爲蝦有比較強的繁殖力，而魚和鴨都比蝦弱。 (Student: 223037) |

### *8.4.2.7 Question 7*

In Q7.1, the students were asked to explain why most of the shrimps died. Students needed to interpret data, draw conclusion(s) from the data and give reasonable explanation(s) for the observed phenomena. In the secondary schools, 85.91% of the students received 0 mark but of which, there were 51.59% who had not attempted this question. Less than 1% of the students could get 3 marks. For the students in special schools, 90.48% of the students received 0 mark and only 9.52% of them scored 1 mark. No student scored 2 marks or above in special schools. The mean score for this question was relatively low. The mean score for the secondary schools was 0.18 and 0.10 for the special schools.

*Table 8.18 Percentage distribution of students of different school types for each score of Q7.1 of Science PA*

| **School Type** | **N** | **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|---|---|
| | | 0.00 | 1.00 | 2.00 | 3.00 | | | |
| Secondary | 845 | 85.91 | 9.94 | 3.89 | 0.25 | 100.0 | 0.18 | (0.49) |
| Special | 21 | 90.48 | 9.52 | 0.00 | 0.00 | 100.0 | 0.10 | (0.30) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

It was interesting to find out that a great deal of the students at the novice level in both secondary and special schools thought that the red shrimps ate the shrimps rather than as a competitor against the shrimps. It was also observed that they just used their common sense knowledge for answering the question without referring to the specific conditions presented in the task.

Samples of students' work are indicated below.

| | |
|---|---|
| Novice level (0 mark)<br>• Inaccurate explanation. | • d 水好臭 (Student: 202035)<br>• It is because some people take away them. (Student: 205003)<br>• water pollution (Student: 205011)<br>• Because their have no oxygen (Student: 211039)<br>• 中毒 (Student: 301007) |

| | |
|---|---|
| Basic level (1 mark)<br>• Explain that the decrease in population of the shrimps is due to the problem of shortage of food. | • No Foods (Student: 211031)<br>• It because to many shrimps they didn't have enough food to hold their life (Student: 211034)<br>• 紅蝦吃了所有食物 (Student: 304002) |
| Proficient level (2 marks)<br>• Demonstrate understanding of the relationship of red shrimps and shrimps in the ecosystem as competitor.<br>• Explain that the decrease in population of the shrimps is due to the problem of shortage of food.<br>• Able to explore the rule governing the simulation. | • There is not enough of food for the shrimps, because of the existence of the red shrimps. The shrimps would die easier than re shrimps if there is a inadequacy of food. (Student: 203042)<br>• 因爲他們的遊動比紅蝦還慢,不能尋食到那麼多食物。 (Student: 202002) |
| Advanced level (3 marks)<br>• Demonstrate understanding of the relationship of red shrimps and shrimps in the ecosystem as competitor.<br>• Point out that red shrimps are stronger competitor by exploring the rules.<br>• Explain that the decrease in population of the shrimps is due to the problem of shortage of food.<br>• Able to explore the rule governing the simulation. | • 因爲紅蝦的繁殖率非常高，而紅蝦又以水草爲食糧，此令到蝦多了食糧上的競爭對手，水草不夠吃的時候就導致蝦大量死亡。 (Student: 223013) |

The students were asked to explain why most of the fish died in Q7.2. Table 8.19 presents the results of students' performance. The majority of the students (84.25%) scored 0 mark. There were 52.03% of the secondary school students who did not attempt this question. 32.22% of the students attempted this question and got 0 mark. Less than 5% of the students in secondary schools scored 2 marks or above.

For the special schools, the majority of the students scored 0 mark and only 4.76% of the students scored 1 mark. None of them scored 2 marks or above.

*Table 8.19 Percentage distribution of students of different school types for each score of Q7.2 of Science PA*

| School Type | N | Score (%) | | | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|---|---|
| | | 0.00 | 1.00 | 2.00 | 3.00 | | | |
| Secondary | 845 | 84.25 | 12.02 | 3.53 | 0.19 | 100.0 | 0.20 | (0.49) |
| Special | 21 | 95.24 | 4.76 | 0.00 | 0.00 | 100.0 | 0.05 | (0.22) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

The answering patterns in Q7.2 were similar to those of Q7.1. The results indicated that some students in both secondary and special schools had the misconception that the red shrimps would eat fish. For students in secondary and special schools at the novice level, they gave the following answers:

| | |
|---|---|
| Novice level (0 mark)<br>• Inaccurate explanation. | • 可能魚和紅蝦是相剋的動物 (Student: 223005)<br>• They are eaten by red shrimps (Student: 203012)<br>• 因爲紅蝦不斷吸取水中的所有氧 (Student: 223034)<br>• 魚也每天被魚民捕捉，所以一宜減(Student: 302010) |

According to Table 8.19, 12.02% of the students in the secondary schools and 4.76% of the special school students achieved the basic level. They were able to explain that the reason was the shortage of food and gave the following answers:

| | |
|---|---|
| Basic level (1 mark)<br>• Explain that the decrease in population of fish is due to the problem of shortage of food. | • 因爲魚沒有食物(蝦) (Student: 223037)<br>• no more food (Student: 225004)<br>• 冇糧食 (Student: 303014) |

3.53% of the students in secondary schools were at the proficient level. They were able to point out the decrease in population of shrimps and the problem of shortage of food and gave the following answers:

| | |
|---|---|
| Proficient level (2 marks)<br>• Point out the death of the shrimps.<br>• Explain the decrease in population of fish is due to the problem of shortage of food. | • 因爲蝦的數量大量下降,魚因沒有食物而餓死。(Student: 202043)<br>• The fish dies because the shrimps die since they need shrimps as food. (Student: 203043) |

Only 0.19% of the students in secondary schools were at the advanced level. They were able to point out the relationships in the ecosystem and gave the following answers:

| | |
|---|---|
| Advanced level (3 marks)<br>• Demonstrate understanding of the relationship of fish and shrimps in the ecosystem as predator and prey.<br>• Point out that the death of the shrimps is due to the problem of shortage of food.<br>• Explain that the decrease in population of fish is due to the problem of shortage of food. | • 蝦與紅蝦都是吃水草，紅蝦的數量眾多，水草不足，紅蝦及蝦大多餓死，魚因沒有食物，也死亡。(Student: 223006)<br>• 因爲當所有蝦都死了後,魚又不吃紅蝦,那麼魚便會餓死或給鴨子吃掉 (Student: 233043) |

In Q7.3, students were asked to explain the possible impacts of adding a foreign species to an ecosystem. Students needed to interpret data as well as generate and summarize possible impacts. In general, many students could not state the possible impacts of adding a foreign species to an ecosystem. According to Table 8.20, 80.2% of the secondary school students received 0 mark. Of these, there were 52.95% who did not attempt this question in the secondary schools. In other words, 27.25% of the students had attempted this question but got 0 mark. 12.12% of the students got 1 mark, 7.17 % of them got 2 marks and 0.51% got 3 marks in the secondary schools.

For students in the special schools, 90.48% scored 0 mark. However, excluding those “not-reached” students (i.e. students who did not reach the question) and “non-response” (i.e. students who made no response), there were actually 47.62% of the students who scored 0 mark. None of the students in special schools scored 2 marks or above in this question.

*Table 8.20 Percentage distribution of students of different school types for each score of Q7.3 of Science PA*

| **School Type** | **N** | **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|---|---|
| | | 0.00 | 1.00 | 2.00 | 3.00 | | | |
| Secondary | 845 | 80.20 | 12.12 | 7.17 | 0.51 | 100.0 | 0.28 | 0.61 |
| Special | 21 | 90.48 | 9.52 | 0.00 | 0.00 | 100.0 | 0.10 | 0.30 |

N.B. - N listed in the table is the unweighted number of students.
- “Score (%)”, “Mean Score” and “SD” of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

For students at the novice level, they demonstrated no idea or incorrect ideas on the effect of adding foreign species to an ecosystem. They gave answers like these:

| | |
|---|---|
| Novice level (0 mark)<br>• Demonstrate no / incorrect idea(s) on the effect of adding foreign species to an ecosystem. | • 打交 (Student: 214002)<br>• 唔知道 (Student: 222035)<br>• 人們再沒有魚食。(Student: 213004) |

Students at the basic level just pointed out the effect on the pond which they observed and did not make any further interpretation on the ecosystem.

| | |
|---|---|
| Basic level (1 mark)<br>• Demonstrate understanding of the impact on one or two species or just describe the phenomena observed. | • The fish, ducks and shrimps will all dead. (Student: 201033)<br>• It will change the number of the other species. (Student: 209045) |

Students at the proficient level were able to point out the impact which would upset the whole ecosystem.

| | |
|---|---|
| Proficient level (2 marks)<br>• Demonstrate understanding of upsetting of the whole ecosystem and the result of disequilibrium. | • It may change the ecosystem. (Student: 219009)<br>• 引到了池的生態不平衡....>< (Student: 220009)<br>• 會破壞原來的食物鏈 (Student: 229030) |

Students at the advanced level were able to point out the impact which would upset the whole ecosystem as well as some harmful effects on the local species.

| | |
|---|---|
| Advanced level (3 marks)<br>• Demonstrate understanding of upsetting of the whole ecosystem and the result of disequilibrium.<br>• Point out that there may be some harmful effects on the local species in the ecosystem or the foreign species. | • 破壞原有制定出來的食物鏈。大自然要一段時間才可以修復，在這一段時間足以令一些瀕臨絕種的動物絕種。(Student: 223011)<br>• 會導致本來的品種有危險，導致他們死亡，後果好嚴重 (Student: 230032) |

For the last question Q7.4, students were asked to generate a guideline to protect the pond ecosystem. Table 8.21 presents the results of students' performance. 55.34% of the secondary students did not attempt this question. 32.23% of the students had attempted this question and got 0 mark. Less than 7% of the secondary schools students scored 2 marks or above. For special schools, the performance in this question was extremely poor. All the students scored 0 mark. There were 42.86% of the students who did not give response to this question or did not reach this question. In other words, 57.14% of the students in the special schools attempted this question but scored 0 mark.

*Table 8.21 Percentage distribution of students of different school types for each score of Q7.4 (Evaluate) of Science PA*

| School Type | N | Score (%) | | | | Total (%) | Mean Score | (SD) |
|---|---|---|---|---|---|---|---|---|
| | | 0.00 | 1.00 | 2.00 | 3.00 | | | |
| Secondary | 845 | 87.57 | 6.36 | 4.24 | 1.82 | 100.0 | 0.20 | (0.60) |
| Special | 21 | 100.00 | 0.00 | 0.00 | 0.00 | 100.0 | 0.00 | (0.00) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

The majority of the students in both secondary and special schools was not able to generate any rules or regulations or just gave some irrelevant suggestion such as follow:

| | |
|---|---|
| Novice level (0 mark)<br>• Irrelevant answer. | • 禁止飲食 (Student: 220033)<br>• 不可種植 (Student: 220032)<br>• 覺得大家唔應該再破壞 (Student: 303013) |

6.36% of the secondary school students set up a rule directly related to the foreign species like the following:

| | |
|---|---|
| Basic level (1 mark)<br>• Generate a guideline which directly refers to the foreign species - 'the red shrimp'. | • Take away the red shrimps. (Student: 219040) |

4.24% of the secondary school students who were at the proficient level generated some possible guidelines such as the following:

| | |
|---|---|
| Proficient level (2 marks)<br>• Generate a guideline which refers to the whole ecosystem but without reason. | • 不准手多放生物落池塘否則後果自負 (Student: 220010)<br>• 不要給別人把其他動物放生在魚塘內 (Student: 227031) |

Only 1.82 % of the secondary school students were at the advanced level. They were able to generate a guideline related to the whole ecosystem and gave the reasons.

| | |
|---|---|
| Advanced level (3 marks)<br>• Generate a guideline which refers to the whole ecosystem and give reason(s). | • 不要把任何動物放進池內,因為會令生態不平衡。 (Student: 223037)<br>• 不准擅自把新品種在池塘裏，以免其他生物品種絕種。(Student: 223010)<br>• 人們不應擅自把生物放進池塘，因為會破壞生態壞境。(Student: 221009) |

For using the chat room as a communication tool for the discussion, (Table 8.22a) 47.83% of the students in the secondary schools scored 0 mark. 30.38 % of the students scored 1 mark and less than 1 % of them scored 3 marks.

The performance of the students in special schools was a bit worse. 71.43% of the students scored 0 mark and 28.57% of the students scored 1 marked. None of them scored 2 marks or above. However, excluding those “not-reached” and “non-response” students, the results of the students who had attempted this question were indicated in Table 8.22b. It was noted that both secondary and special schools students who had attempted this question at least got 1 mark. In other words, students at both secondary and special schools could post message in the chat room without any difficulties. They were at least at the basic level.

*Table 8.22a Percentage distribution of students of different school types for each score of Q7.4 (Communicate) of Science PA*

| **School Type** | **N** | **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|---|---|
| | | 0.00 | 1.00 | 2.00 | 3.00 | | | |
| Secondary | 845 | 47.83 | 30.38 | 21.30 | 0.49 | 100.0 | 0.74 | (0.80) |
| Special | 21 | 71.43 | 28.57 | 0.00 | 0.00 | 100.0 | 0.29 | (0.46) |

N.B. - N listed in the table is the unweighted number of students.
- “Score (%)”, “Mean Score” and “SD” of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

*Table 8.22b Percentage distribution of students (excluding "not-reached" and "non-response" students) of different school types for each score of Q7.4 (Communicate) of Science PA*

| **School Type** | **N** | **Score (%)** | | | | **Total (%)** | **Mean Score** | **(SD)** |
|---|---|---|---|---|---|---|---|---|
| | | 0.00 | 1.00 | 2.00 | 3.00 | | | |
| Secondary | 447 | 0.00 | 58.23 | 40.83 | 0.94 | 100.0 | 1.43 | (0.51) |
| Special | 21 | 0.00 | 100 | 0.00 | 0.00 | 100.0 | 1.00 | (0.00) |

N.B. - N listed in the table is the unweighted number of students.
- "Score (%)", "Mean Score" and "SD" of secondary schools are weighted statistics.
- Figures may not sum to 100 percent because of rounding

It was observed that most of the students in both secondary and special schools used the chat room since the simulation programme had started. For example, they used the chat room and asked the others about how to do Q4.

| | |
|---|---|
| (Student: 229012) | • 有冇人知道點數 D... |
| (Student: 229006) | • nono |
| (Student: 229005) | • ^^ |
| (Student: 229002) | • 我睇個表架炸 |
| (Student: 229012) | • 你點數架 |
| (Student: 229002) | • 我都話睇倨表.. |

However, most of them just posted many nonsense ideas and did not use the chat room for the discussion seriously. Below are some samples of students' work.

| | |
|---|---|
| Basic Level (1 mark)<br>• Students posted questions or feelings but showed no response to the others. | • 點解魚會死(Student: 216013)<br>• 我想返屋企(Student: 201013) |
| Proficient Level (2 marks)<br>• Students were able to post idea(s) in the chat room and give response(s) to classmate(s). | • d 蝦點做呀? 多到做唔到(Student: 223007)<br>• 系囉，差蝦咋(Student: 223008)<br>• 我咪又係(Student: 223007)<br>• 有冇人數到蝦= =?(Student: 223008)<br>• d 蝦點做呀(Student: 223007)<br>• 數到頭刀暈= =(Student: 223008) |
| Advanced Level (3 marks)<br>• Students were able to engage in a meaningful discussion. | • 咁佢地要我地討論囉=.=(Student: 223002)<br>• 不如唔好比 d 訪客入去(Student: 223011)<br>• 起圍欄,叫工作人員睇住! (Student: 223013)<br>• 我地應該唔可以俾 d 死鬼遊客擺野落去! (Student: 223002)<br>• 不如唔好俾人入去，好唔好? (Student: 223013)<br>• 或者掃帚掃走哂Ｄ人(Student: 223013)<br>• 咁起個公園做咩? (Student: 223002) |

## 8.5 Students' Performance across Secondary Schools

In the previous section, results indicated that there were differences among students' performance across different question items in both secondary and special schools. In this section, we will explore students' performance across the secondary schools. As only 4 special schools were involved in this study, no analysis was conducted across the special schools.

Figure 8.6 shows the boxplots of students' performance in the 7 IL dimensions of Science PA across secondary schools. It was observed that smaller dispersion was found in the dimensions of "create", "evaluate" and "communicate" and larger dispersion was found in the "define", "access'" and "integrate" dimensions. There were outliers in the dimensions of "manage", "integrate", "create", and "evaluate". As shown in Figure 8.6, students from one school (school 223) demonstrated apparently better performance in the dimensions of "manage", "integrate" and "evaluate".

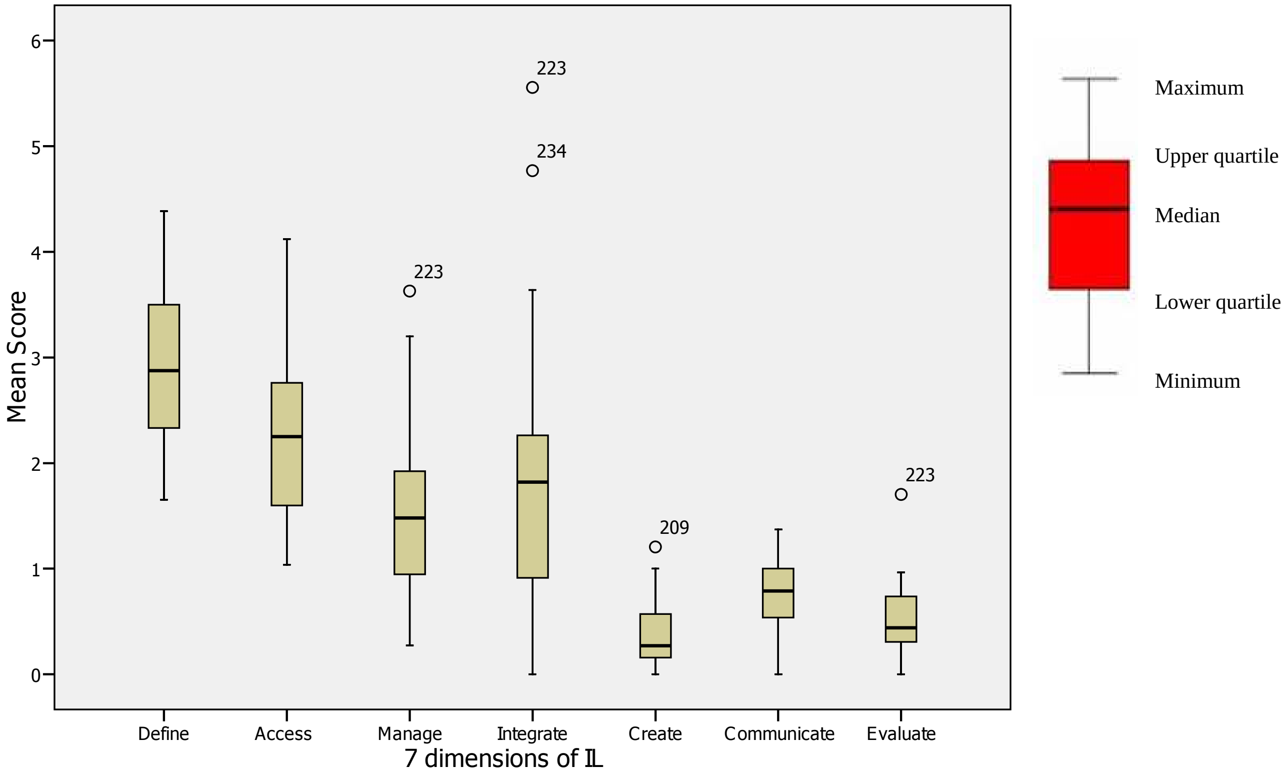



*Figure 8.6 Students' IL performance in Science PA across secondary schools*

Apart from the 7 IL dimensions, a "total" score was also calculated for each school by adding up respective mean scores of all the 7 IL dimensions. Results from the descriptive analysis are shown in Table 8.23a. It was revealed that the minimum "total" score was 4.45 and the maximum was 19.56 in secondary schools. It was interesting to note that for some schools, the students got 0 mark in the dimensions of "integrate", "create", "evaluate" and "communicate". There were large differences across schools in the "define" and "access" dimensions.

*Table 8.23a Mean scores of 8 IL indicators in Science PA for 33 secondary schools*

| IL Indicator | Min | Max | Full Score | Mean Score | (SD) | Mean Score Percentage (%) |
|---|---|---|---|---|---|---|
| Define | 1.65 | 4.38 | 9 | 2.97 | (0.77) | 33.00 |
| Access | 1.04 | 4.12 | 6 | 2.22 | (0.82) | 37.00 |
| Manage | 0.27 | 3.63 | 8 | 1.50 | (0.78) | 18.75 |
| Integrate | 0.00 | 5.56 | 15 | 1.86 | (1.11) | 12.40 |
| Create | 0.00 | 1.21 | 3 | 0.38 | (0.28) | 12.67 |
| Communicate | 0.00 | 1.37 | 3 | 0.74 | (0.29) | 24.67 |
| Evaluate | 0.00 | 1.70 | 6 | 0.49 | (0.32) | 8.17 |
| Total | 4.45 | 19.56 | 50 | 10.15 | (3.34) | 20.30 |

N=33

N.B. - N listed in the table is the unweighted number of schools.
- "Mean Score", "SD" and "Mean Score Percentage (%)" are weighted statistics.

When examining the mean scores of 8 IL indicators of Science PA across the secondary schools, results from ANOVA as shown in Table 8.23b indicated that there were statistically significant performance differences across schools in the 8 IL indicators.

*Table 8.23b ANOVA of 8 IL indicators across secondary schools in Science PA*

| IL Indicator | df | F | Sig. |
|---|---|---|---|
| Define | 32,812 | 5.06 | 0.00* |
| Access | 32,812 | 5.98 | 0.00* |
| Manage | 32,812 | 6.16 | 0.00* |
| Integrate | 32,812 | 5.25 | 0.00* |
| Create | 32,812 | 6.12 | 0.00* |
| Communicate | 32,812 | 3.54 | 0.00* |
| Evaluate | 32,812 | 3.46 | 0.00* |
| Total | 32,812 | 11.15 | 0.00* |

N.B. - Difference significant if Sig (p) <0.05.

## 8.6 Comparing the Difficulty Levels of the Seven Dimensions of Information Literacy in Science Performance Assessment

When comparing the difficulty levels of the 7 dimensions of IL, the Project Team would like to point out the constraints in the design of the performance tasks in the assessment. Tasks related to the dimension of "evaluate" and "communicate" were put in the last question of the assessment. To a certain extent, it might affect students' performance in completing the tasks. Therefore, in order to find out the difficulty levels of the 7 dimensions of IL in the assessment, the mean scores of the students who had actually attempted the questions in both secondary and special schools were shown in Table 8.24 and 8.25. In other words, those “not-reached” and “non-response” students were not taken into account. Besides, the Project Team would like to point out that as the full score of each IL dimension was not the same, only looking at mean scores would not be sufficient for comparison to be made across dimensions. It would also be necessary to look at mean score percentages for comparison purpose.

*Table 8.24 Mean scores of secondary school students (excluding those “not-reached” and “non-response” students) across the 8 IL indicators of Science PA*

| **IL Indicator** | **N** | **Min** | **Max** | **Mean Score** | **(SD)** | **Full Score** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|
| Define | 844 | 0 | 8 | 2.96 | (1.86) | 9 | 32.89 |
| Access | 844 | 0 | 6 | 2.23 | (1.89) | 6 | 37.17 |
| Manage | 746 | 0 | 8 | 1.73 | (1.59) | 8 | 21.63 |
| Integrate | 610 | 0 | 13 | 2.71 | (2.76) | 15 | 18.07 |
| Create | 667 | 1 | 3 | 0.48 | (0.71) | 3 | 16.00 |
| Communicate | 447 | 0 | 3 | 1.43 | (0.51) | 3 | 47.67 |
| Evaluate | 367 | 0 | 5 | 1.03 | (1.35) | 6 | 17.17 |
| Total | 845 | 0 | 36 | 10.24 | (5.90) | 50 | 20.48 |

N.B. - N listed in the table is the unweighted number of students.
- “Mean Score”, “SD” and “Mean Score Percentage (%)” are weighted statistics.

*Table 8.25 Mean scores of special schools students (excluding those “not-reached” and “non-response” students) across the 8 IL indicators of Science PA*

| **IL Indicator** | **N** | **Min** | **Max** | **Mean Score** | **(SD)** | **Full Score** | **Mean Score Percentage (%)** |
|---|---|---|---|---|---|---|---|
| Define | 21 | 0 | 7 | 2.95 | (2.09) | 9 | 32.78 |
| Access | 21 | 0 | 5 | 1.90 | (1.64) | 6 | 31.67 |
| Manage | 15 | 0 | 4 | 1.27 | (1.39) | 8 | 15.88 |
| Integrate | 17 | 0 | 7 | 1.29 | (2.31) | 15 | 8.60 |
| Create | 6 | 1 | 1 | 0.43 | (0.51) | 3 | 14.33 |
| Communicate | 14 | 0 | 1 | 1.00 | (0.00) | 3 | 33.33 |
| Evaluate | 12 | 0 | 1 | 0.17 | (0.39) | 6 | 2.83 |
| Total | 21 | 2 | 16 | 7.48 | (4.14) | 50 | 14.96 |

N.B. - N listed in the table is the unweighted number of students.
- “Mean Score”, “SD” and “Mean Score Percentage (%)” are unweighted statistics.

As indicated in Table 8.24, “communicate”, “access” and “define”’ were the three dimensions with higher mean score percentages and “integrate”, “create” and “evaluate” were the dimensions with lower mean score percentages as performed by the secondary school students. In other words, among the 7 dimensions, “integrate, “create” and “evaluate” were the more difficult ones. With reference to the tasks designed, these questions required much higher-order thinking skills and complex technical skills of the students.

The performances of students in the special schools were more or less the same (Table 8.25). The top three dimensions with higher scores were “communicate”, “define” and “access”. Poor performance was found in the “evaluate”, “create” and ‘‘integrate’’ dimensions.

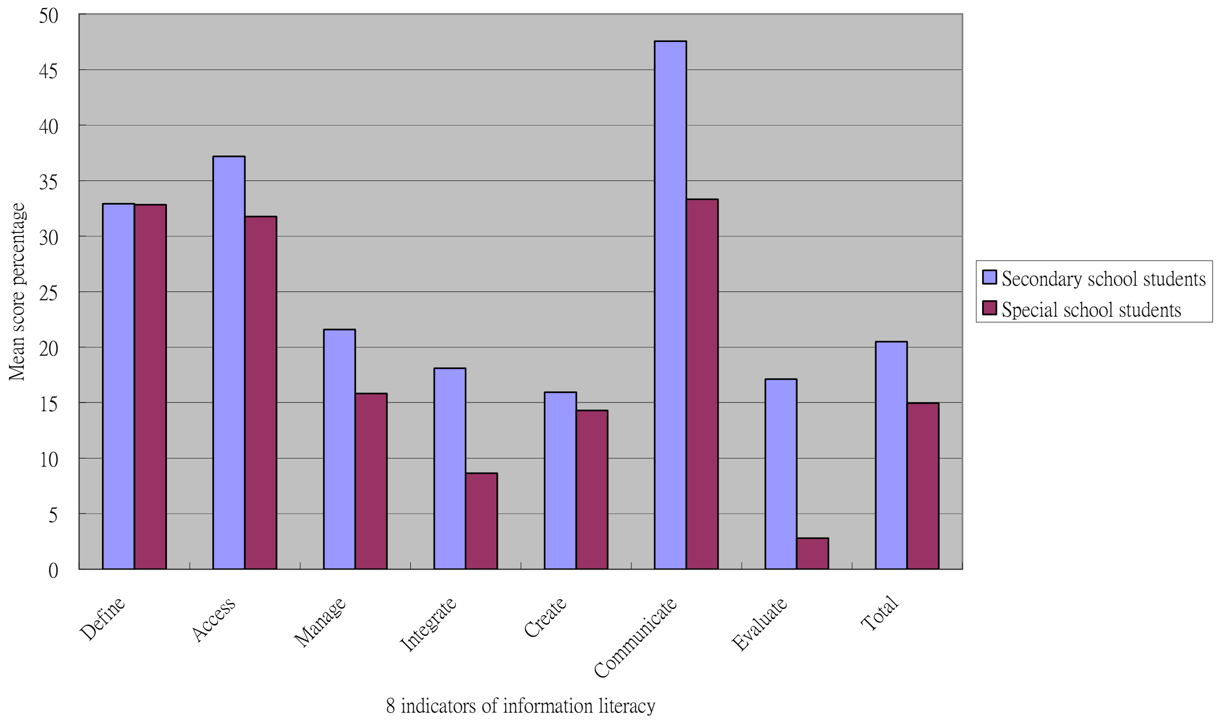



*Figure 8.7 Mean score percentages of secondary and special schools students (excluding those “not-reached” and “non-response” students) in the 8 IL indicators of Science PA*

When comparing students’ mean score percentages of the 8 IL indicators in both secondary and special schools (Figure 8.7), it was found that there was not much difference in the “define” and “create” dimensions and larger differences were found in the dimensions of “integrate”, “communicate” and “evaluate”.

## 8.7 Summary

This section will be divided into two parts. The first part is the summary of findings on IL in the Science PA. The second part will conclude the findings on Science subject-specific knowledge.

### 8.7.1 Students' Information Literacy Competences in Science Performance Assessment

#### *8.7.1.1 Students' performance in the 7 IL dimensions of Science PA*

Results from the PA indicated that both secondary and special school students (including those "not-reached" and "non-response" students) had better performances in the dimensions of "define" and "access" and attained at least the basic level. Poor performances were found in the ''integrate'' and "evaluate" dimensions. When considering the design of the assessment tasks, it was found that the tasks for the "integrate" and "evaluate" dimensions were those demanding higher-order thinking skills which included the combination of subject knowledge and technical skills whereas tasks for "define" and "access" were more on the operational skills. In other words, it was revealed that students were able to manage some low-level IL skills in Science; however, the performance of students in the tasks requiring higher-order thinking skills was not good.

#### *8.7.1.2 Quality of information search*

As mentioned before, students in both secondary and special schools were able to attain the basic level of IL in the dimensions of "access" and "define" but not for the higher-order IL skills. They were not aware of the quality and relevance of the piece of information which they had searched (as mentioned in 8.4.2.2). They did not trace, compare and contrast different source(s) of information to find out the authenticity of the piece of information which they had obtained.

#### *8.7.1.3 Seeking help from online sources*

It was observed that students in both secondary and special schools were able to use online tools such as chat room, MSN and Yahoo Knowledge to seek help from others. However, they just stayed on asking for an answer. Whenever an answer was obtained, there was no evidence that they critically examined whether the information was true or not.

#### *8.7.1.4 Use of communication tools for meaningful discussion*

It was discovered that students in both secondary and special schools were able to post questions and express their feelings in the chat room. However, most of them were at the basic level. They posted questions and sought for answers. In-depth and meaningful discussions were seldom found in the assessment. This might reflect that students did not know how to engage in a meaningful discussion by using the emerging technology.

### 8.7.2 Summary of Findings on Science-specific Knowledge

Results from the assessment reflected that students in both secondary and special schools were able to solve simple and straight-forward questions and they were weak in answering those questions which required generalization and interpretation and their reasoning skills were weak.

When students were exploring the simulation programme, they were able to tackle some quantitative problems but not for some open-ended qualitative problems. Most of the students did not explore the rules that governed the simulation and they resorted to common sense reasoning without looking at the constraints and patterns in the simulation. They seemed to lack higher levels of theorizing and discussion skills.

Furthermore, there was a lack of descriptors of expected achievements in the area of IL skills across the Science curriculum. This study provides exemplars in different dimensions of IL in Science which would be helpful in framing and constructing those descriptors in Science Education KLA.

## 8.8 Recommendations

### 8.8.1 Enhancing Students' Information Literacy Proficiency

The findings from the assessment indicated that there was still room for improvement in the dimensions of "define", "access" and "manage'' and students were particularly weak in the ''integrate" and "evaluate" dimensions. It is suggested that learning activities focusing on developing students' ability to critically evaluate the quality, relevance, and accuracy of digital information are needed.

### 8.8.2 Discussion Approach in Learning and using Open-ended Questions in Assessment

Findings revealed that students' reasoning skills and generalization skills were weak. It is suggested that more learning and teaching activities on this aspect are encouraged. Besides, it seemed that most of the students were still not familiar with some open-ended type of questions and they did not have the knowledge and skills in engaging in meaningful discussion. It is suggested that teachers in designing the assessment tasks may include more open-ended elements.

### 8.8.3 Designing Descriptors to Indicate Levels of Information Literacy across Science Curriculum

As IL skills is one of the important generic skills, it is of value to develop a set of descriptors of IL in different key learning stages and expected achievements in respective key stages should be delineated.

# Chapter 9 Findings on Questionnaire and Further Analysis on the Performance Assessment

Findings related to the four survey questionnaires including School Head Questionnaire, Teacher Questionnaire, ITC Questionnaire and Student Questionnaire in the primary, secondary and special schools will be reported first. Then, a further analysis of the PA for each subject in both primary and secondary schools will be presented. As the number of special school students participated was small, no further analysis (as described in sections 9.5 to 9.8) was conducted for the special schools.

## 9.1 General Findings of School Head Questionnaire

School Head Questionnaire was designed to collect information on curriculum goals, pedagogy and ICT used in the school as well as staff development and leadership. There were 30 questions in this questionnaire. A total of 37 primary school heads, 31 secondary school heads and 3 special school heads participated in this study. Detailed descriptive statistics were presented in Annexes 1a, 1b and 1c. Some major findings of School Head Questionnaire were presented in the following sections. The mean of each item as described in the following sections was calculated using the respective Likert scale.

### 9.1.1 Curriculum Goals

***Curriculum goals in subject-specific content***

In Q2 (as show in Figure 9.1), school heads were asked to what extent their agreement on encouraging teachers (Chinese Language and Mathematics teachers in the primary schools, Chinese Language and Science teachers in the secondary and special schools) to achieve the curriculum goals in subject-specific content on a four-point Likert scale where “1=Strongly disagree”, “2=Disagree”, “3=Agree” and “4=Strongly agree”.

Q2

To what extent do you agree or disagree that the school leadership (you and/or other school leaders) encourages Chinese and Science teachers at Secondary 2 / Mathematics and Chinese teachers at Primary 5 to achieve the following goals?

| | |
|---|---|
| A | To cover the prescribed curriculum content |
| B | To improve students' performance on assessments/examinations |
| C | To individualize student learning experiences in order to address different learning needs |
| D | To increase learning motivation and make learning more interesting |
| E | To foster students' ability and readiness to set own learning goals and to plan, monitor and evaluate own progress |
| F | To foster collaborative and organizational skills when working in teams |
| G | To provide activities which incorporate real-world examples/settings/applications for student learning |
| H | To provide opportunities for students to learn from experts and peers from other schools/organizations/countries |
| I | To foster communication skills in face-to-face and/or on-line situations |
| J | To prepare students for responsible Internet behavior (e.g., not to commit mail-bombing such as spam) and/or to cope with cyber crime (e.g., Internet fraud and illegal access to secure information) |
| K | To improve students' skills in seeking and handling information |
| L | To encourage the use of standard Chinese for online communication |

*Figure 9.1 Question related to Curriculum goals in subject-specific content (Q2 of School Head Questionnaire)*

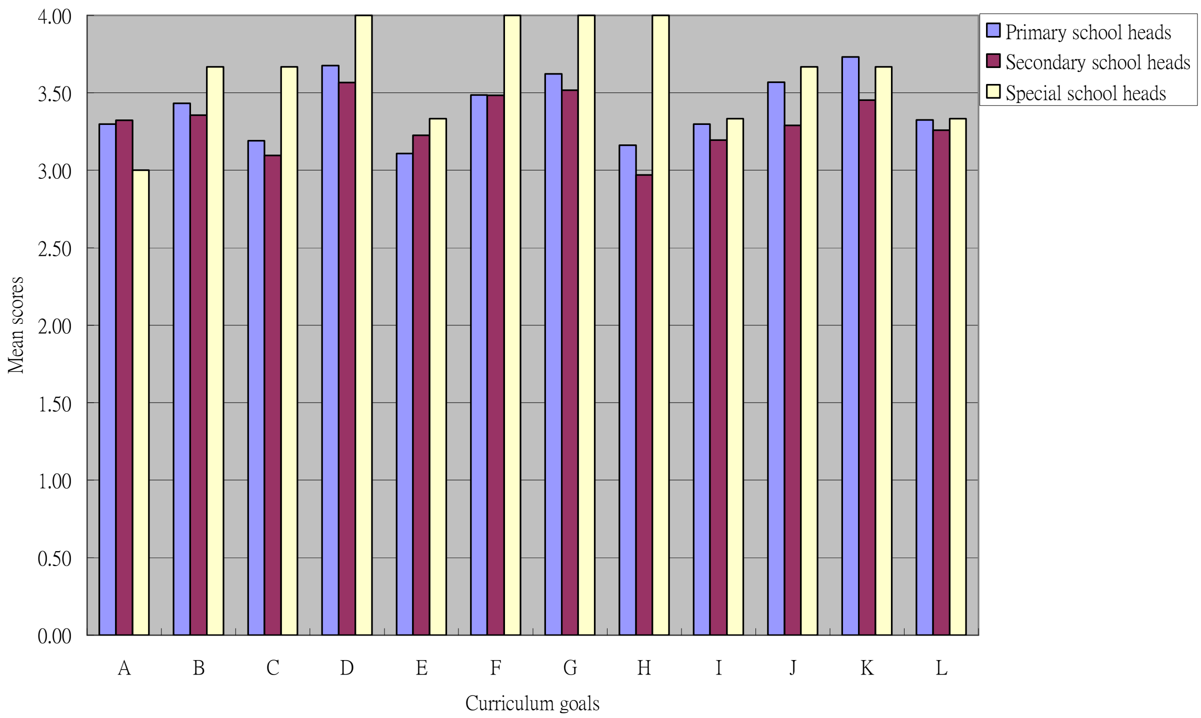



*Figure 9.2 Level of agreement on encouraging target teachers to achieve the curriculum goals as indicated by school heads*

The results were presented in Figure 9.2. It was indicated that nearly all the mean scores were above 3. In other words, school heads generally agreed with encouraging teachers to achieve the 12 listed curriculum goals. The goal related to increasing learning motivation and making learning more interesting (item D in Figure 9.2) gained the highest level of agreement.

Factor analysis (using SITES 2006 Hong Kong data)[5] suggested that these 12 items could be categorized into two factors. Items A and B were categorized as "traditionally important curriculum goals" and the rest of the items as "emerging curriculum goals". The "emerging curriculum goals", which refer to lifelong learning, collaborative inquiry as well as using ICT to strengthen communication skills, are important to the success in the 21$^{st}$ century. Table 9.1 indicated that the primary school heads showed a slightly higher level of agreement on encouraging teachers to achieve traditionally important curriculum goals among the three school types. The special school heads indicated a slightly lower level of agreement on the traditionally important curriculum goals but higher level of agreement on the emerging curriculum goals. Comparatively speaking, the secondary school heads' indication of their level of agreement on the emerging curriculum goals were a bit lower than those of the primary and special school heads.

*Table 9.1 Level of agreement on encouraging target teachers to achieve the traditionally important /emerging curriculum goals as indicated by school heads*

| **Types of curriculum goals** | **Primary Schools** | | **Secondary Schools** | | **Special Schools** | |
|---|---|---|---|---|---|---|
| | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| Traditionally important curriculum goals | 3.36 | (0.44) | 3.34 | (0.52) | 3.33 | (0.76) |
| Emerging curriculum goals | 3.42 | (0.32) | 3.32 | (0.46) | 3.70 | (0.26) |
| N | 37 | | 31 | | 3 | |

### *Curriculum goals related to use of ICT in school*

School heads were also asked to use a four-point Likert scale where "1=Not at all", "2=A little", "3=Somewhat" and "4=A lot", to indicate the importance of using ICT in the 10 goals listed below for the students in the Primary 5 (P5) and Secondary 2 (S2) levels (Q3 of School Head Questionnaire).

5 SITES 2006 Hong Kong data was collected in the SITES 2006 study. Factor analysis was conducted in the SITES 2006 study by using School Head Questionnaire and Teacher Questionnaire. In this Phase (II) Study, the Project Team would adopt some of the factors found in the SITES 2006 study for analyzing the data collected from the questionnaires.

*Table 9.2 Level of importance of the use of ICT in school in the target grade as indicated by school heads (Q3 of School Head Questionnaire)*

| Curriculum goals | | Primary Schools | | Secondary Schools | | Special Schools | |
|---|---|---|---|---|---|---|---|
| | | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| A | To prepare students for the world of work | 2.95 | (0.81) | 3.03 | (0.84) | 3.00 | (1.00) |
| B | To improve students' performance on assessments/examinations | 2.86 | (0.63) | 3.00 | (0.77) | 2.33 | (1.15) |
| C | To promote active learning strategies | 3.51 | (0.61) | 3.45 | (0.62) | 3.67 | (0.58) |
| D | To individualize student learning experiences in order to address different learning needs | 3.30 | (0.74) | 3.16 | (0.78) | 3.67 | (0.58) |
| E | To foster collaborative and organizational skills when working in teams | 3.32 | (0.67) | 3.23 | (0.73) | 3.67 | (0.58) |
| F | To develop students' independence and responsibility for their own learning | 3.43 | (0.60) | 3.29 | (0.64) | 3.67 | (0.58) |
| G | To do exercises to practise skills and procedures | 3.03 | (0.60) | 3.03 | (0.60) | 3.00 | (0.00) |
| H | To increase learning motivation and make learning more interesting | 3.57 | (0.65) | 3.45 | (0.68) | 3.67 | (0.58) |
| I | To satisfy parents' and the community 's expectations | 2.95 | (0.62) | 2.74 | (0.63) | 3.33 | (0.58) |
| J | To act as a catalyst in changing the pedagogical approaches of teachers | 3.19 | (0.52) | 3.13 | (0.76) | 3.67 | (0.58) |
| N | | 37 | | 31 | | 3 | |

The results indicated that the goal "to increase learning motivation and make learning more interesting" (item H in Table 9.2) was ranked the highest by school heads of all the three school types. The mean scores for the primary school heads, secondary school heads and special school heads were 3.57, 3.45 and 3.67 respectively. For both primary and special school heads, they perceived the use of ICT to "improve students' performance on assessments/examinations" (item B) to be the least significant as the mean scores were only 2.86 and 2.33 respectively. Secondary school heads considered the goal "to satisfy parents' and the community's expectation" (item I) as the least important goal with the mean score of 2.74.

The use of IT in the related curriculum goals of using ICT was one of the core indicators. Factor analysis results of SITES 2006 showed two subscales from these items. They were the traditionally important curriculum goals using ICT (items A, B, C, D, G, H, and I in Table 9.2) and the emerging curriculum goals using ICT (items E, F and J).

The mean scores of the subscales were presented in Table 9.3. All school heads indicated that using ICT in traditionally important curriculum goals was more important than in the emerging curriculum goals. After comparing their responses across the three school types, it was found that the special school heads had the highest mean scores in using ICT for both the traditional and emerging curricula, while the lowest mean scores were found amongst the secondary school heads in using ICT for both traditional and emerging curricula.

*Table 9.3 Level of importance of the use of ICT in school in traditionally important/emerging curriculum goals*

| **Different types of curriculum goals** | **Primary Schools** | | **Secondary Schools** | | **Special Schools** | |
|---|---|---|---|---|---|---|
| | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| Using ICT in traditionally important curriculum goals | 3.32 | (0.46) | 3.28 | (0.75) | 3.67 | (0.58) |
| Using ICT in emerging curriculum goals | 3.17 | (0.45) | 3.12 | (0.49) | 3.24 | (0.44) |
| N | 37 | | 33 | | 3 | |

### 9.1.2 Resource Allocation

Resource allocation is one of the important factors that affects the use of ICT in learning and teaching. In Q6 of School Head Questionnaire, school heads were asked to indicate the priority level that they gave to the following purposes of resource allocation as shown in Figure 9.3 in their schools in order to enhance the use of ICT in learning and teaching for the Primary 5/Secondary 2 students in their schools. A total of 11 items were listed in a four-point Likert Scale where "1=Not a priority", "2=Low priority", "3=Medium priority" and "4=High priority".

Q6 What priority level do you give to the following purposes of resource allocation in your school in order to enhance the use of ICT in teaching and learning for the Primary 5 students / Secondary 2 students in your school?

A To decrease the number of students per computer

B To increase the number of computers connected to the Internet

C To increase the bandwidth for Internet access

D To increase the range of digital learning resources related to the school curriculum

E To establish/enhance an online learning support platform and its management so that teaching and learning can take place any time, anywhere

F To improve the technical skills of teachers

G To improve the ability of teachers to make good pedagogical use of ICT

H To broaden teachers' pedagogical repertoire and to widen their pedagogical competence to engage in new methods of teaching and learning

I To improve students' ICT skills

J To provide teachers with incentives (including salary adjustment and promotion) to integrate ICT use in their teaching

K To increase the number of teachers using ICT for teaching/learning purposes

*Figure 9.3 Question related to the priority of resource allocation (Q6 of School Head Questionnaire)*

As shown in Figure 9.4 (Q6 of School Head Questionnaire), around 60% of the primary school heads indicated that "to broaden teachers' pedagogical repertoire and to widen their pedagogical competence to engage in new methods of teaching and learning" (item H in Figure 9.3) as a high priority in their resource allocation. Only about 5% of the primary school heads indicated that they would give "to provide teachers with incentives (including salary adjustment and promotion) to integrate ICT use in their teaching" (item J) high priority. For the secondary school heads, about 50% of them gave high priorities "to increase the range of digital learning resources related to the school curriculum" (item D) and "to establish/enhance an online learning support platform and its management so that teaching and learning can take place any time, anywhere" (item E). Similar to the primary school heads, around 5% of them would accord high priority to item J (see Figure 9.4). For the special schools, all school heads reflected that a high priority would be given to the following 4 areas when allocating resources:

- To establish/enhance an online learning support platform and its management so that teaching and learning can take place any time, anywhere (item E in Figure 9.3)
- To improve the technical skills of teachers (item F in Figure 9.3)
- To improve the ability of teachers to make good pedagogical use of ICT (item G in Figure 9.3)
- To broaden teachers' pedagogical repertoire and to widen their pedagogical competence to engage in new methods of teaching and learning (item H in Figure 9.3)

None of the special schools school head gave high priority to "decrease the number of students per computer" (item A in Figure 9.3) and "provide teachers with incentives (including salary adjustment and promotion) to integrate ICT use in their teaching" (item J in Figure 9.3).

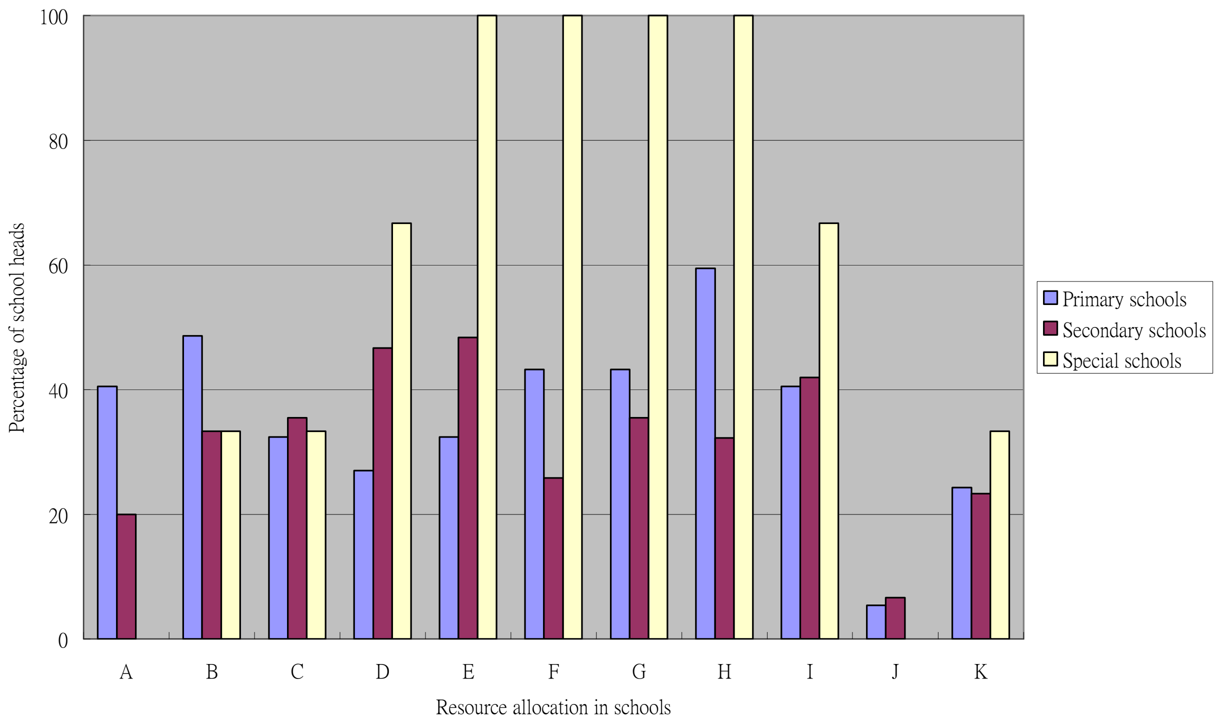



*Figure 9.4 Percentage of school heads indicating that high priority was given to the particular resource allocation in school*

Three sub-scales of priority themes for resource allocation were formed by factor analysis in SITES 2006 Hong Kong. They were basic infrastructure (items A, B, C, D and E in Figure 9.3), teachers' pedagogy and students' competence in ICT (item G, H, I) and other manpower resources (item F, J and K). The respective means were calculated.

*Table 9.4 Mean scores of school heads' views on the priority of particular resource category*

| **Priority themes of resource allocation** | **Primary Schools** | | **Secondary Schools** | | **Special Schools** | |
|---|---|---|---|---|---|---|
| | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| Basic infrastructure | 3.16 | (0.56) | 3.02 | (0.69) | 3.40 | (0.40) |
| Teachers' pedagogy and students' competence in using ICT | 3.43 | (0.45) | 3.22 | (0.64) | 3.89 | (0.19) |
| Other manpower resources | 2.64 | (0.63) | 2.65 | (0.69) | 2.89 | (0.69) |
| N | 37 | | 30 | | 3 | |

Results in Table 9.4 indicated that school heads from all the three school types had similar priority when allocating resources. The first priority was given to the strengthening of teachers' pedagogy and students' competence in using ICT. The second priority was given to the improvement of basic infrastructure and the third to "other manpower resources".

### 9.1.3 Method of Assessment

Assessment is one of the major issues in our curriculum reform. As recommended in CDC (2001), there should be a change in assessment practice. The process of learning and assessment for learning should be taken as an integral part of learning. To a great extent, different types of assessment methods may also reflect different kinds of pedagogical approaches. In School Head Questionnaire, Q11 was to find out the school heads' views on encouraging teachers to use different types of assessment on a four-point Likert scale, with "1=Strongly disagree", "2=Disagree", "3=Agree" and "4=Strongly agree". Eight items as shown in Table 9.5 were categorized into three types of assessment – "traditionally important assessments", "learning products", and "reflection/collaboration" (using SITES 2006 Hong Kong data).

While primary school heads indicated that "group presentation" (item D in Table 9.5) (mean=3.38) was mostly encouraged to be used, "written task or exercise" (item B) was mostly encouraged by secondary school heads (mean=3.50). "Portfolio/learning log" (item G) (mean=3.67) and "group assessment scores for collaborative tasks" (item H) (mean=3.67) were mostly encouraged by the special school heads.

As revealed in Table 9.6, the primary school heads strongly agreed on encouraging teachers to use assessment on "learning products". "Traditionally important assessments" was encouraged to be used by the secondary schools heads whereas special school heads strongly agreed on using assessments on "reflection and collaboration".

*Table 9.5 Level of agreement on encouraging teachers to use different types of assessment at the target grade as indicated by school heads (Q11 of School Head Questionnaire)*

| Types of assessment | | | Primary Schools | | Secondary Schools | | Special Schools | |
|---|---|---|---|---|---|---|---|---|
| | | | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| Traditionally important assessments | A | Written test/examination | 3.32 | (0.53) | 3.43 | (0.57) | 2.67 | (0.58) |
| | B | Written task/exercise | 3.27 | (0.51) | 3.50 | (0.51) | 2.67 | (0.58) |
| Learning products | C | Individual oral presentation | 3.30 | (0.52) | 3.37 | (0.56) | 3.33 | (0.58) |
| | D | Group presentation (oral/written) | 3.38 | (0.49) | 3.40 | (0.50) | 3.33 | (0.58) |
| | E | Project report and/or (multimedia) product | 3.35 | (0.48) | 3.40 | (0.56) | 3.33 | (0.58) |
| Reflection/collaboration | F | Students' peer evaluations | 3.16 | (0.60) | 3.13 | (0.73) | 3.33 | (0.58) |
| | G | Portfolio/learning log | 3.16 | (0.50) | 3.00 | (0.79) | 3.67 | (0.58) |
| | H | Group assessment scores for collaborative tasks | 2.97 | (0.37) | 3.10 | (0.66) | 3.67 | (0.58) |
| N | | | 37 | | 30 | | 3 | |

*Table 9.6 Level of agreement on encouraging teachers to use the three types of assessment as indicated by school heads*

| Types of assessment | Primary Schools | | Secondary Schools | | Special Schools | |
|---|---|---|---|---|---|---|
| | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| Traditionally important assessments | 3.30 | (0.51) | 3.47 | (0.49) | 2.67 | (0.58) |
| Learning products | 3.34 | (0.46) | 3.39 | (0.50) | 3.33 | (0.58) |
| Reflection/collaboration | 3.10 | (0.41) | 3.08 | (0.63) | 3.56 | (0.51) |
| N | 37 | | 30 | | 3 | |

### 9.1.4 Requirement of Teachers' Knowledge and Skills

The art of teaching is a complex process. In this knowledge society, to facilitate teaching, teachers do not only need to have subject-content knowledge and pedagogical knowledge, but also technological pedagogical content knowledge (TPCK) to work well in classes. In Q12, school heads were asked about the knowledge and skills that teachers required or were encouraged to acquire. They were to indicate their perceptions in a three-point Likert scale where “1=No”, “2=Yes, encouraged” and “3=Yes, required”.

| Are teachers of Chinese and/or Science/or Mathematics at (Primary 5/secondary 2) required or encouraged to acquire knowledge and skills in each of the following? | |
|---|---|
| A | Integrating Web-based learning in their instructional practice |
| B | Using new ways of assessment (portfolios and peer reviews) |
| C | Developing real-life assignments for students |
| D | Using real-life assignments developed by others |
| E | Using computers for monitoring student progress |
| F | Organizing forms of team-teaching |
| G | Collaborating with other teachers via ICT |
| H | Communicating with parents via ICT |
| I | Being knowledgeable about the pedagogical issues of integrating ICT into teaching and learning |
| J | Using subject-specific learning software (e.g., tutorials and simulation) |

*Figure 9.5 Question about the knowledge and skills that teachers needed or were encouraged to acquire (Q12 of School Head Questionnaire)*

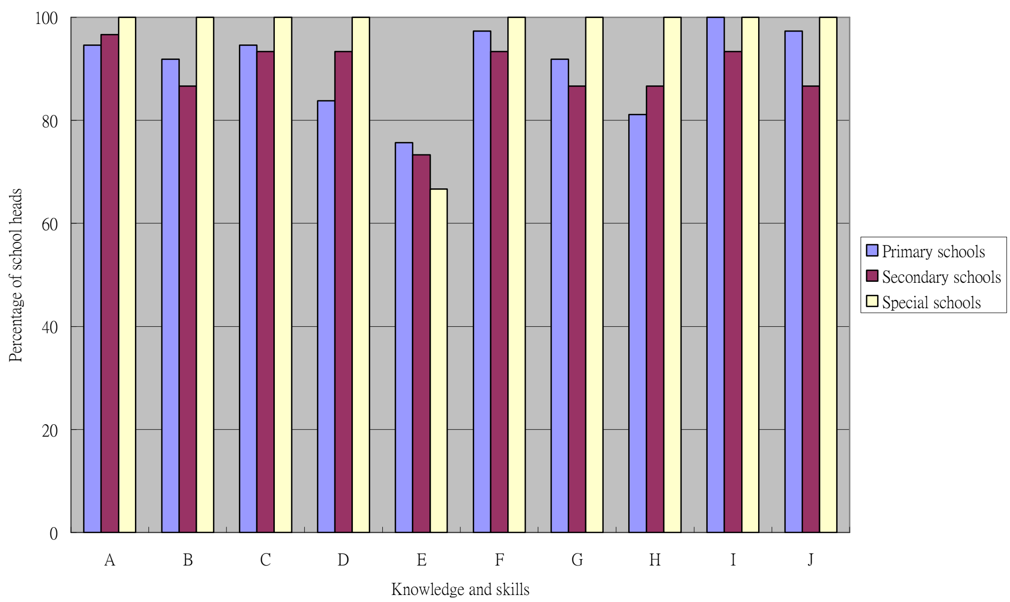



*Figure 9.6 Percentage of school heads indicating the knowledge and skills which teachers required or were encouraged to acquire*

As shown in Figure 9.6 (Q12 of School Head Questionnaire), nearly all the 10 listed items were considered to be required by teachers or were encouraged to be acquired for teachers by the school heads. Comparatively speaking, among the 10 items, only the skill of "using computers for monitoring student progress" (item E in Figure 9.6) was of slightly lower percentage as perceived by the school heads (Primary: 62.16%, Secondary: 70.00% Special: 66.67%). However, as shown in Table 9.7 most of the school heads only indicated that these skills were encouraged to be acquired by teachers and only a small percentage of them indicated that teachers were required to have these skills. It was interesting to note that for primary school heads, among the 10 listed items, item "using new ways of assessment" (item B in Table 9.7) was one of the skills not required by teachers. For items H and I, the percentage of secondary school heads who indicated that these two skills were required by teachers was higher than that of the primary school heads.

*Table 9.7 Percentage of school heads indicating the knowledge and skills which teachers required or were encouraged to acquire (Q12 of School Head Questionnaire)*

| **Knowledge and skills** | | **Percentage (%)** | | | | | |
|---|---|---|---|---|---|---|---|
| | | Yes, Encouraged | | | Yes, Required | | |
| | | Primary | Secondary | Special | Primary | Secondary | Special |
| A | Integrating Web-based learning in their instructional practice | 86.49 | 96.67 | 100.00 | 8.11 | 0.00 | 0.00 |
| B | Using new ways of assessment (portfolios and peer reviews) | 91.89 | 80.00 | 66.67 | 0.00 | 6.67 | 33.33 |
| C | Developing real-life assignments for students | 83.78 | 90.00 | 66.67 | 10.81 | 3.33 | 33.33 |
| D | Using real-life assignments developed by others | 75.68 | 90.00 | 100.00 | 8.11 | 3.33 | 0.00 |
| E | Using computers for monitoring student progress | 62.16 | 70.00 | 66.67 | 13.51 | 3.33 | 0.00 |
| F | Organizing forms of team-teaching | 83.78 | 83.33 | 100.00 | 13.51 | 10.00 | 0.00 |
| G | Collaborating with other teachers via ICT | 81.08 | 80.00 | 66.67 | 10.81 | 6.67 | 33.33 |
| H | Communicating with parents via ICT | 75.68 | 76.67 | 100.00 | 5.41 | 10.00 | 0.00 |
| I | Being knowledgeable about the pedagogical issues of integrating ICT into teaching and learning | 94.59 | 76.67 | 66.67 | 5.41 | 16.67 | 33.33 |
| J | Using subject-specific learning software (e.g., tutorials and simulation) | 78.38 | 76.67 | 100.00 | 18.92 | 10.00 | 0.00 |

Three categories of knowledge and skills were formed by factor analysis in SITES 2006 Hong Kong. They were: knowledge and skills in curriculum integration (items A, I, J in Table 9.7), knowledge and skills in organising learning process (items B, C, D, E, F, G) and knowledge and skills for parent-teacher communication (item H). Among the three categories, all school heads showed their greatest concern about encouraging or requiring teachers to have knowledge and skills in curriculum integration as illustrated in Table 9.8. For special schools, equal weighting was also found in the category which teachers should have the knowledge and skills in organizing learning process as perceived by the school heads.

*Table 9.8 Mean scores of school heads' views on teachers' knowledge and skills*

| Categories of knowledge and skills | Primary Schools | | Secondary Schools | | Special Schools | |
|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | Mean | (SD) |
| Curriculum integration | 2.08 | (0.27) | 2.01 | (0.32) | 2.11 | (0.19) |
| Organizing learning process | 1.99 | (0.27) | 1.93 | (0.31) | 2.11 | (0.35) |
| Parent-teacher communication | 1.86 | (0.48) | 1.97 | (0.49) | 2.00 | (0.00) |
| N | 37 | | 30 | | 3 | |

### 9.1.5 Competence for School Leadership Team

In the second IT in education strategy (EMB, 2004), it was clearly stated that the third strategic goal was 'Enhancing school leadership for the knowledge age'. In Q13 of School Head Questionnaire, it was intended to find out school heads' views on the priority of what kinds of competences that school leadership should acquire. A total of 10 items was listed in a four-point Likert scale where "1=Not a priority", "2=Low priority", "3=Medium priority" and "4=High priority".

Both primary and secondary school heads indicated that competences on "developing a common pedagogical vision among teaching staff in the school" (item A in Table 9.9) and "managing the innovation of pedagogical practices in the school" (item B) were of the top priorities. The primary school heads showed less concern about "organizing cooperation with other schools regarding the development of ICT-based teaching and learning" (item H) while the secondary school heads indicated less concern about "organizing cooperation with other schools regarding the development of ICT-based teaching and learning" (item H) and "organizing cooperation with other schools regarding the development of teaching and learning materials" (item G). For special schools, school heads also indicated that competence in "developing a common pedagogical vision among teaching staff in the school" (item A) was the top priority. All the ten listed competences were perceived at least at medium priority level by the special school heads.

*Table 9.9 Mean scores of school heads' views on the priority of school leadership competences (Q13 of School Head Questionnaire)*

| School Leadership Competences | | Primary Schools | | Secondary Schools | | Special Schools | |
|---|---|---|---|---|---|---|---|
| | | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| A | Developing a common pedagogical vision among teaching staff in the school | 3.54 | (0.51) | 3.43 | (0.63) | 4.00 | (0.00) |
| B | Managing the innovation of pedagogical practices in the school | 3.51 | (0.51) | 3.33 | (0.66) | 3.33 | (1.15) |
| C | Explaining to teachers the relevance of encouraging students to be responsible for their own learning process and outcomes | 3.05 | (0.52) | 3.27 | (0.64) | 3.67 | (0.58) |
| D | Identifying best practices that exist outside the school regarding the integration of ICT in learning | 2.84 | (0.60) | 2.60 | (0.72) | 3.00 | (0.00) |
| E | Promoting collaboration amongst teachers of different subjects | 3.46 | (0.56) | 2.97 | (0.61) | 3.67 | (0.58) |
| F | Managing the adoption of ICT-supported methods for assessing student progress | 2.57 | (0.65) | 2.67 | (0.76) | 3.67 | (0.58) |
| G | Organizing cooperation with other schools regarding the development of teaching and learning materials | 2.38 | (0.76) | 2.03 | (0.67) | 3.00 | (1.00) |
| H | Organizing cooperation with other schools regarding the development of ICT-based teaching and learning | 2.27 | (0.65) | 2.03 | (0.67) | 3.00 | (1.00) |
| I | Promoting the integration of ICT in the teaching and learning of traditional subjects | 3.08 | (0.68) | 3.03 | (0.56) | 3.33 | (0.58) |
| J | Developing a strategic plan for integrating ICT use in teaching and learning | 3.11 | (0.52) | 2.83 | (0.79) | 3.67 | (0.58) |
| N | | 37 | | 30 | | 3 | |

## 9.2 General Findings of Teacher Questionnaire

In this study, Teacher Questionnaire was designed to collect the data on teachers' teaching practices in using ICT in the respective KLAs. The information include: the curriculum goals in their practices, teacher pedagogical practices orientation, student practices, and impacts of ICT use. There were 37 questions in this questionnaire. Altogether, 79 Chinese Language teachers, 37 Science teachers and 40 Mathematics teachers participated in this study. Findings of Teacher Questionnaire were briefly reported below. For detailed descriptive statistics, please refer to Annexes 2a, 2b and 2c. The mean of each item was calculated by using the respective Likert scale.

### 9.2.1 Types of Classroom Activities and Use of ICT

In Q7, teachers were asked to indicate the frequency of conducting the listed learning activities in a 4-point scale where "1=Never", "2=Sometimes", "3=Often" and "4=Nearly always" and the use of ICT in such activities in a two points scale where "1=No" and "2=Yes". The responses from different subject teachers at the primary, secondary and special schools were presented in Table 9.10 – 9.12.

As indicated in Table 9.10, the top three frequently conducted learning activities conducted by Mathematics teachers were "teacher's lectures" (item H in Table 9.10) (mean=3.53), "exercises to practise skills and procedures" (item I) (mean=3.20) and "visualization" (item L) (mean=2.98) whereas "extended projects" (item A) (mean=1.85) and "field study activities" (item G) (mean=1.73) were less frequently conducted. Among these activities, ICT was more commonly used in "teacher's lectures" (item H), "short-task projects" (item B) and "processing and analyzing data" (item N) and less commonly used in "field study activities" (item G) and "exploring mathematical patterns of objects" (item K).

*Table 9.10 Mean scores of the frequency of conducting the learning activities by primary Mathematics teachers and the percentage of teachers showing that ICT was used in conducting those activities (Q7 of the Teacher Questionnaire)*

| Learning activities | | Mean | (SD) | Percentage of teachers indicating the use of ICT in the activity (%) |
|---|---|---|---|---|
| A | Extended projects (2 weeks or longer) | 1.85 | (0.77) | 65.00 |
| B | Short-task projects | 2.20 | (0.52) | 85.00 |
| C | Product creation (e.g., making a model or a report) | 2.03 | (0.70) | 65.00 |
| D | Self-accessed courses and/or learning activities | 2.20 | (0.61) | 75.00 |
| E | Mathematical investigations | 2.38 | (0.63) | 57.50 |
| F | Open-ended questions | 2.53 | (0.68) | 47.50 |
| G | Field study activities | 1.73 | (0.78) | 35.00 |
| H | Teacher's lectures | 3.53 | (0.72) | 90.00 |
| I | Exercises to practise skills and procedures | 3.20 | (0.91) | 60.00 |
| J | Discovering Mathematics principles and concept | 2.85 | (0.77) | 60.00 |
| K | Exploring Mathematical patterns of objects | 2.55 | (0.78) | 45.00 |
| L | Visualization | 2.98 | (0.80) | 70.00 |
| M | Looking up ideas and information | 2.63 | (0.81) | 72.50 |
| N | Processing and analyzing data | 2.70 | (0.69) | 85.00 |

N=40

*Table 9.11 Mean scores of the frequency of conducting the learning activities by Chinese Language teachers and the percentage of teachers showing that ICT was used in conducting those activities (Q7 of the Teacher Questionnaire)*

| **Learning Activities** | **Primary Schools Chinese Language Teachers** Mean | (SD) | Percentage of teachers indicating the use of ICT in the activity (%) | **Secondary Schools Chinese Language Teachers** Mean | (SD) | Percentage of teachers indicating the use of ICT in the activity (%) | **Special Schools Chinese Language Teachers** Mean | (SD) | Percentage of teachers indicating the use of ICT in the activity (%) |
|---|---|---|---|---|---|---|---|---|---|
| A Extended projects (2 weeks or longer) | 1.71 | (0.56) | 65.85 | 1.51 | (0.61) | 40.00 | 1.67 | (0.58) | 66.67 |
| B Short-task projects | 2.07 | (0.65) | 82.93 | 2.03 | (0.71) | 45.71 | 2.00 | (0.00) | 100.00 |
| C Product creation (e.g., making a model or a report) | 2.02 | (0.57) | 63.41 | 2.17 | (0.86) | 57.14 | 2.33 | (0.58) | 100.00 |
| D Self-accessed courses and/or learning activities | 2.54 | (0.71) | 78.05 | 2.54 | (0.89) | 48.57 | 2.33 | (0.58) | 100.00 |
| E Field study activities | 1.61 | (0.63) | 34.15 | 1.34 | (0.48) | 17.14 | 2.00 | (0.00) | 66.67 |
| F Teacher's lectures | 3.66 | (0.57) | 100.00 | 3.60 | (0.65) | 88.57 | 3.00 | (1.00) | 100.00 |
| G Practice exercises | 2.98 | (0.99) | 68.29 | 3.17 | (0.89) | 68.57 | 2.33 | (0.58) | 66.67 |
| H Looking up and evaluating information | 2.85 | (0.76) | 97.56 | 2.46 | (0.92) | 68.57 | 3.00 | (1.00) | 100.00 |
| N | 41 | | | 35 | | | 3 | | |

The three more frequently conducted activities as reported by the primary Chinese Language teachers were "teacher's lectures" (item F) (mean=3.66), "practice exercises" (item G) (mean=2.98) and "looking up and evaluating information" (item H) (mean=2.85). The least two commonly conducted activities were "extended projects" (item A) (mean=1.71) and "field study activities" (item E) (mean=1.61). The secondary Chinese Language teachers reported that "teacher's lectures" (item F) (mean=3.60), "practice exercises" (item G) (mean=3.17) and "self-accessed courses and/or learning activities" (item D) (mean=2.54) were the three more commonly conducted activities. Similar to the primary Chinese Language teachers, "extended projects" (item A) (mean=1.51) and "field study activities" (item E) (mean=1.34) were not commonly conducted. For the Chinese Language teachers in the special schools, they indicated that "teacher's lectures" (item F) (mean=3.00) and "looking up and evaluating information" (item H) (mean=3.00) were the top two most popular activities whereas "extended projects" (item A) (mean=1.67) were not frequently conducted.

While concerning the use of ICT, Chinese Language teachers in special schools showed a greater tendency in using ICT to conduct the mentioned activities except "practice exercises" than the primary and secondary school teachers.

*Table 9.12 Mean scores of the frequency of conducting the learning activities by Science teachers of the secondary and special schools and the percentage of teachers showing that ICT was used in conducting those activities (Q7 of Teacher Questionnaire)*

| | **Learning Activities** | **Secondary Schools Science Teachers** | | | **Special Schools Science Teachers** | | |
|---|---|---|---|---|---|---|---|
| | | Mean | (SD) | Percentage of teachers indicating the use of ICT in the activity (%) | Mean | (SD) | Percentage of teachers indicating the use of ICT in the activity (%) |
| A | Extended projects (2 weeks or longer) | 1.94 | (0.74) | 61.76 | 2.00 | (1.00) | 66.67 |
| B | Short-task projects | 2.21 | (0.73) | 73.53 | 2.67 | (1.15) | 100.00 |
| C | Product creation (e.g., making a model or a report) | 2.00 | (0.55) | 70.59 | 2.33 | (0.58) | 100.00 |
| D | Self-accessed courses and/or learning activities | 2.03 | (0.63) | 61.76 | 2.33 | (1.53) | 66.67 |
| E | Scientific investigations (open-ended) | 2.12 | (0.69) | 61.76 | 2.67 | (1.15) | 66.67 |
| F | Field study activities | 1.68 | (0.73) | 26.47 | 2.67 | (1.15) | 66.67 |
| G | Teacher's lectures | 3.56 | (0.61) | 94.12 | 3.33 | (1.15) | 100.00 |
| H | Exercises to practise skills and procedures | 3.00 | (0.60) | 70.59 | 2.67 | (1.15) | 66.67 |
| I | Laboratory experiments with clear instructions and well-defined outcomes | 3.35 | (0.60) | 64.71 | 2.67 | (1.15) | 66.67 |
| J | Discovering scientific principles and concepts | 2.41 | (0.86) | 44.12 | 2.33 | (1.53) | 66.67 |
| K | Studying natural phenomena through simulations | 2.18 | (0.87) | 50.00 | 2.00 | (1.73) | 66.67 |
| L | Looking up ideas and information | 2.35 | (0.81) | 70.59 | 2.67 | (1.15) | 100.00 |
| M | Processing and analyzing data | 2.26 | (0.71) | 64.71 | 1.67 | (1.15) | 66.67 |
| N | | 34 | | | 3 | | |

The results reported by Science teachers in both secondary and special schools were presented in Table 9.12. “Teacher’s lectures” (item G in Table 9.12) (mean=3.56), “laboratory experiments with clear instructions and well-defined outcomes” (item I) (mean=3.35) and “exercises to practise skills and procedures” (item H) (mean=3.00) were the top three popular activities conducted by Science teachers of the secondary schools. “Extended projects” (item A) (mean=1.94) and “field study activities” (item F) (mean=1.68) were not commonly conducted as reported by them. Except two activities [“field study activities” (item F) and “discovering scientific principles and concepts” (item J)], over 50% of Science teachers of the secondary schools indicated that ICT was used when conducting the other activities.

Similar to other subjects, Science teachers of the special schools also ranked “teacher’s lectures” (item G) (mean=3.33) as the most common activity. “Processing and analyzing data” (item M) (mean=1.67) was not frequently conducted. Percentages of Science teachers of the special schools indicated that ICT was used when conducting the listed activities were higher than those of secondary schools except in “exercises to practice skills and procedures” (item H).

To conclude, the more commonly conducted classroom activities were the traditional ones such as “teacher’s lectures” (item G), whereas “extended projects” (item A) were not commonly conducted as perceived by all targeted subject teachers of the three school types.

### 9.2.2 Types of Pedagogical Practices and Use of ICT

Apart from the classroom activities, teachers’ pedagogical practices were also investigated in Teacher Questionnaire. In Q12, teachers were asked about how often the listed pedagogical practices were conducted in the target classes and the use of ICT for these activities on a 4-point Likert scale where “1=Never”, “2=Sometimes”, “3=Often” and “4=Nearly always”. Table 9.13 shows the mean scores from the targeted teachers of the primary, secondary and special schools. The two commonly conducted pedagogical activities as reported by the primary Chinese Language and Mathematics teachers as well as the secondary Science teachers were “use classroom management to ensure an orderly, attentive classroom” (item G in Table 9.13) and “present information/demonstration and or give class instructions” (item A). For the secondary Chinese Language teachers, “use classroom management to ensure an orderly, attentive classroom” (item G) and “assess students' learning through tests/quizzes” (item E) were the top two pedagogical practices. For teachers of the special schools, it seemed that they did not focus on one or two types of practices but more different types of activities were conducted on average. The Chinese Language teachers of the special schools also ranked “use classroom management to ensure an orderly, attentive classroom” (item G) as the top pedagogical practice whereas Science teachers of the special schools ranked “present information/demonstrations and/or give class instructions” (item A) as the most frequently adopted practice

*Table 9.13 Mean scores of the frequency of the types of pedagogical practices by teachers (Q12a of Teacher Questionnaire)*

| | Types of Pedagogical Practices | Primary Schools Chinese Language Teachers | | Primary Schools Mathematics Teachers | | Secondary Schools Chinese Language Teachers | | Secondary Schools Science Teachers | | Special Schools Chinese Language Teachers | | Special Schools Science Teachers | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| A | Present information/demonstrations and/or give class instructions | 3.24 | (0.80) | 3.18 | (0.87) | 2.97 | (0.86) | 3.09 | (0.87) | 2.33 | (0.58) | 3.33 | (1.15) |
| B | Provide remedial or enrichment instruction to individual students and/or small groups of students | 2.44 | (0.84) | 2.95 | (0.85) | 2.31 | (0.76) | 2.41 | (0.66) | 2.00 | (0.00) | 2.33 | (1.53) |
| C | Help/advise students in exploratory and inquiry activities | 2.68 | (0.79) | 2.83 | (0.78) | 2.60 | (0.74) | 2.65 | (0.73) | 2.00 | (0.00) | 3.00 | (1.00) |
| D | Organize, observe or monitor student-led whole-class discussions, demonstrations, presentations | 2.68 | (0.93) | 2.55 | (0.99) | 2.77 | (0.81) | 2.29 | (0.76) | 2.00 | (0.00) | 2.33 | (1.53) |
| E | Assess students' learning through tests/quizzes | 2.93 | (0.79) | 2.95 | (0.85) | 3.14 | (0.85) | 2.88 | (0.73) | 2.33 | (0.58) | 2.67 | (1.15) |
| F | Provide feedback to individuals and/or small groups of students | 3.15 | (0.65) | 2.93 | (0.83) | 2.69 | (0.76) | 2.62 | (0.74) | 2.33 | (0.58) | 3.00 | (1.00) |
| G | Use classroom management to ensure an orderly, attentive classroom | 3.68 | (0.47) | 3.28 | (0.88) | 3.46 | (0.89) | 3.26 | (0.79) | 2.67 | (1.15) | 3.00 | (1.00) |
| H | Organize, monitor and support team-building and collaboration among students | 3.22 | (0.76) | 2.65 | (0.80) | 2.43 | (0.81) | 2.41 | (0.66) | 1.67 | (0.58) | 2.33 | (1.53) |
| I | Organize and/or mediate communication between students and experts/external mentors | 2.10 | (1.02) | 2.03 | (0.86) | 1.63 | (0.81) | 1.76 | (0.82) | 1.67 | (0.58) | 2.33 | (1.53) |
| J | Liaise with collaborators (within or outside school) for student collaborative activities | 2.34 | (0.91) | 2.15 | (0.77) | 1.94 | (0.76) | 1.88 | (0.81) | 2.00 | (0.00) | 2.67 | (1.15) |
| K | Provide counseling to individual students | 2.76 | (0.86) | 2.58 | (0.93) | 2.71 | (0.86) | 2.15 | (0.74) | 2.33 | (0.58) | 3.00 | (1.00) |
| L | Collaborate with parents/guardians/ caretakers in supporting/monitoring students' learning and/or in providing counseling | 2.66 | (0.79) | 2.40 | (0.74) | 2.17 | (0.71) | 1.82 | (0.72) | 2.33 | (0.58) | 3.00 | (1.00) |
| N | | 41 | | 40 | | 35 | | 34 | | 3 | | 3 | |

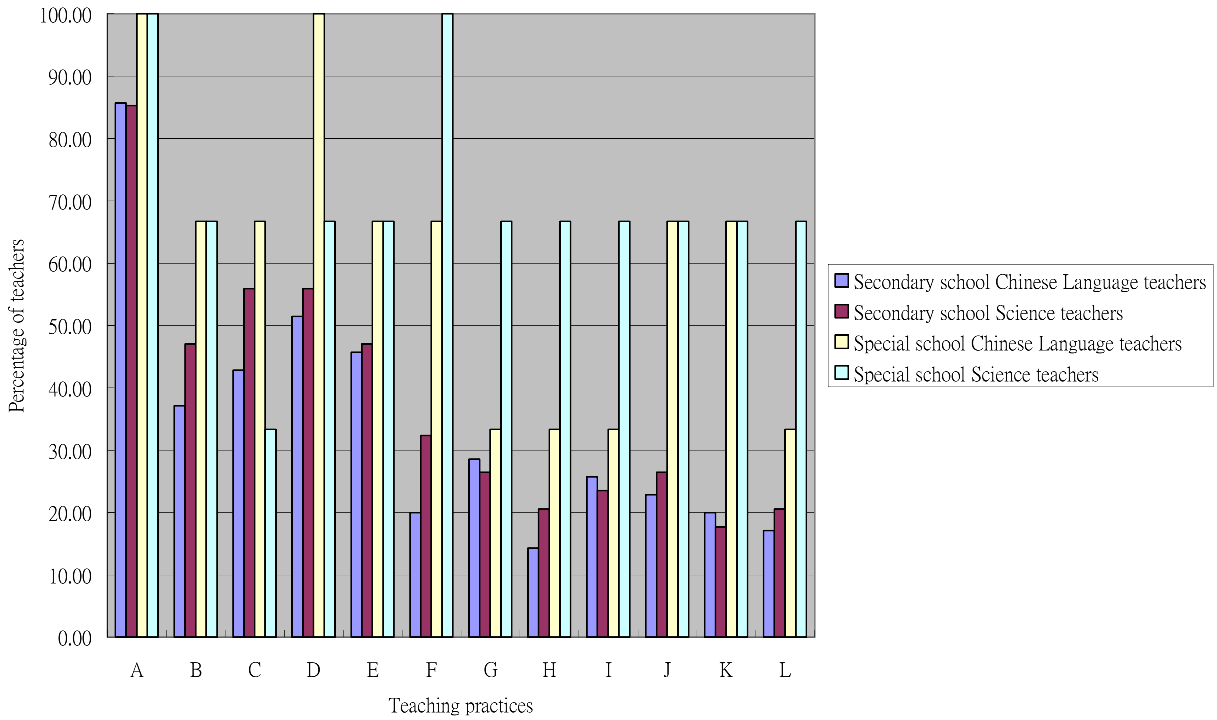



*Figure 9.7 Teacher's pedagogical practices using ICT (Q12b of Teacher Questionnaire)*

From Figure 9.7 (Q12b of Teacher Questionnaire), it was observed that in general, teachers of the special schools had a greater tendency in using ICT for their pedagogical practices. In secondary schools, Science teachers used more ICT than the Chinese Language teachers in all the listed teaching practices except in "present information/demonstration and/or give class instructions" (item A in Table 9.13), "organise and/or mediate communication between students and experts/external mentors" (item I), "use classroom to ensure an orderly, attentive classroom" (item G) and in "provide counseling to individual students" (item K).

Results from factor analysis in SITES 2006 suggested that for further analysis, all the 12 items could be grouped into three pedagogical practice orientations; namely "traditionally important practices" (items A, E and G in Table 9.13), "lifelong learning practices" (items B, C, D, F, H and K) and "connectedness practices" (items I, J and L).

*Table 9.14 Mean scores of the three pedagogical practice orientations and the use of ICT*

| **Pedagogical Practice Orientations and the Use of ICT** | **Primary Schools Chinese Language Teachers** | | **Primary Schools Mathematics Teachers** | | **Secondary Schools Chinese Language Teachers** | | **Secondary Schools Science Teachers** | | **Special Schools Chinese Language Teachers** | | **Special Schools Science Teachers** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| Traditionally important practices | 3.28 | (0.49) | 3.13 | (0.70) | 3.19 | (0.60) | 3.08 | (0.54) | 2.44 | (0.77) | 3.00 | (1.00) |
| Lifelong learning practices | 2.82 | (0.56) | 2.75 | (0.62) | 2.59 | (0.61) | 2.44 | (0.50) | 2.06 | (0.19) | 2.67 | (1.17) |
| Connectedness practices | 2.37 | (0.67) | 2.19 | (0.60) | 1.91 | (0.60) | 1.82 | (0.72) | 2.00 | (0.33) | 2.67 | (1.20) |
| *ICT for traditional practices* | 0.63 | (0.24) | 0.53 | (0.30) | 0.53 | (0.30) | 0.54 | (0.32) | 0.67 | (0.33) | 0.78 | (0.38) |
| *ICT for lifelong practices* | 0.41 | (0.33) | 0.38 | (0.35) | 0.31 | (0.31) | 0.38 | (0.34) | 0.67 | (0.44) | 0.72 | (0.48) |
| *ICT for connectedness practices* | 0.28 | (0.35) | 0.26 | (0.37) | 0.22 | (0.33) | 0.24 | (0.41) | 0.44 | (0.51) | 0.67 | (0.58) |
| N | 41 | | 40 | | 35 | | 34 | | 3 | | 3 | |

All the teachers, except Science teachers of the special schools had the same patterns in their pedagogical practice orientations, i.e. traditionally important practices were ranked as the highest, then lifelong learning and finally connectedness practices. For special school Science teachers, traditionally important practices were also ranked the highest but equal weighting was found in lifelong learning and connectedness practices.

When comparing teachers' scores per school type, it was discovered that primary Chinese Language teachers gave higher scores than primary Mathematics teachers in both pedagogical types of practices and the use of ICT for those practices. In the secondary schools, Science teachers' mean scores for the types of teaching practices were lower than those of Chinese Language teachers but were higher than those of the Chinese Language teachers when using ICT for those practices. For the special schools, Science teachers indicated higher scores than those of the Chinese Language teachers in both pedagogical types of practices and the use of ICT for those practices.

Besides, in Q16, teachers were also asked whether they have used ICT in teaching and learning activities of the target class. 87.65% of the primary school teachers (including both 77.50% of Mathematics and 97.56 % of Chinese Language teachers) had used ICT in conducting learning and teaching activities in the target classes whereas a little bit lower percentage (84%) was found for the secondary level (including 88.24% of Science teachers and 77.14% of Chinese Language teachers in secondary schools and 100% for both Science and Chinese Language teachers in special schools).

### 9.2.3 Assessments and Use of ICT

In the Basic Education Curriculum Guide Building on Strengths (Primary 1 – Secondary 3) Booklet 5 – "School /Policy on Assessment – Changing Assessment Practices" (CDC 2002, p.2), it was clearly stated that

> 'Assessment is the practice of collecting evidence of student learning in terms of knowledge, skills, values and attitudes through observation of student behavior when carrying out tasks, test, examination, etc.'

Besides, research also pointed out how we accessed students might affect the learning and teaching processes (Clarke, 2001, Stiggins 1999). Therefore, different assessment methods would focus on different kinds of learning outcomes that targeted and reflected different kinds of learning and teaching practice. In Teacher Questionnaire, a total of eight assessment methods were listed and teachers were asked whether they had used those assessment methods in their teaching or not and whether they had used ICT in carrying out those assessments. The eight assessment methods were further categorized into three broad assessment types by factor analysis (in SITES 2006 Hong Kong); namely "traditionally important assessments" "learning products" and "reflection/collaboration" as shown in Figure 9.8 below.

| **Types of Assessment** | | **Assessment listed in Teacher Questionnaire** |
|---|---|---|
| Traditionally important assessments | A | Written test/examination |
| | B | Written task/exercise |
| Learning products | C | Individual oral presentation |
| | D | Group presentation (oral/written) |
| | E | Project report and/or (multimedia) product |
| Reflection/collaboration | F | Students' peer evaluations |
| | G | Portfolio/learning log |
| | H | Assessment of group performance on collaborative tasks |

*Figure 9.8 Types of assessment in Teacher Questionnaire (Q13 of Teacher Questionnaire)*

Results indicated that similar patterns were found amongst all teachers. The most frequently used assessment was the traditional type, then the "learning products" followed by "reflection /collaboration". In general, higher percentages of Chinese Language teachers of the primary and secondary schools indicated their use of those assessment methods than the Mathematics and Science teachers. Primary school Mathematics teachers' use of ICT for assessment was not very common with all respective mean percentages less than 45%. It was interesting to find out that a higher mean percentage of Mathematics teachers indicated their use of ICT for the assessment type on "reflection and collaboration" than the primary Chinese Language teachers. In the secondary schools, a higher percentage of Science teachers indicated their use of ICT for all the three types of assessment than the Chinese Language teachers.

Results from the findings seemed to indicate that the use of ICT for assessing students' reflection and collaborative work was still rather limited with mean percentages of less than 25% in general.

There should be rooms for the development in this area.

*Table 9.15 Mean percentages of the use of assessment methods and the use of ICT to carry out those assessments as indicated by teachers*

| **Types of Assessment and *the Use of ICT*** | **Mean Percentage (%)** | | | | | |
|---|---|---|---|---|---|---|
| | **Primary Schools Chinese Language Teachers** | **Primary Schools Mathematics Teachers** | **Secondary Schools Chinese Language Teachers** | **Secondary Schools Science Teachers** | **Special Schools Chinese Language Teachers** | **Special Schools Science Teachers** |
| Traditionally important assessments | 98 | 96 | 100 | 97 | 100 | 100 |
| Learning products | 88 | 74 | 74 | 71 | 78 | 78 |
| Reflection/collaboration | 61 | 52 | 57 | 44 | 56 | 78 |
| *ICT used for Traditionally important assessments* | 51 | 25 | 46 | 50 | 67 | 83 |
| *ICT used for Learning products* | 54 | 42 | 45 | 57 | 56 | 78 |
| *ICT used for Reflection/collaboration* | 19 | 23 | 13 | 22 | 22 | 78 |
| N | 41 | 40 | 35 | 34 | 3 | 3 |

### 9.2.4 Students' Practices and Use of ICT

In Q14a of Teacher Questionnaire, teachers were also asked about how often students were engaged in the listed 12 activities in a 4-point Likert scale ranging from "1=Never", "2=Sometimes", "3=Often", "4=Nearly always" and if the students used ICT for these activities or not with the scale "1=No" and "2=Yes" The 12 activities were further classified into three categories of student practices by factor analysis (in SITES 2006 Hong Kong). They were "traditionally important practice" (items A, C and H in Table 9.16), "lifelong learning practices" (items B, D, E, F, I and J) and "connectedness practices" (items G, K, L).

Similar patterns were found amongst the teachers across the three school types. The top three student activities were "students working on the same learning materials at the same pace and/or sequences", "complete worksheets, exercises" and "answer tests or respond to evaluations". They were all clustered in the category of "traditionally important practices". The three activities with lower mean scores were "communicate with outside parties", "contribute to the community through their own learning activities" and "collaborate with peers from other schools within and/or outside the country". They were all under the category of "connectedness practices".

As regards, students' use of ICT for the listed activities, it was observed from Figure 9.9 that ICT was used more frequently in "traditionally important practices" and less in "connectedness practices". No ICT was used in group activities under the category of "connectedness practices" as indicated by Chinese Language teachers of the special schools and they used ICT more frequently in lifelong learning practices.

*Table 9.16 Mean scores of student practices (Q14 of Teacher Questionnaire)*

| Categories of Student Practices | | Student Activities | Primary Schools Chinese Language Teachers | | Primary Schools Mathematics Teachers | | Secondary Schools Chinese Language Teachers | | Secondary Schools Science Teachers | | Special Schools Chinese Language Teachers | | Special Schools Science Teachers | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mean | (SD) | Mean | (SD) | Mean | (SD) | Mean | (SD) | Mean | (SD) | Mean | (SD) |
| Traditionally important practices | A | Students working on the same learning materials at the same pace and/or sequence | 3.37 | (0.80) | 2.98 | (0.89) | 3.29 | (0.79) | 2.91 | (0.79) | 2.67 | (1.15) | 3.33 | (1.15) |
| | C | Complete worksheets, exercises | 3.49 | (0.68) | 3.38 | (0.81) | 3.31 | (0.72) | 3.03 | (0.67) | 3.00 | (1.00) | 3.33 | (1.15) |
| | H | Answer tests or respond to evaluations | 3.10 | (0.74) | 2.93 | (0.76) | 3.06 | (0.91) | 2.71 | (0.80) | 2.67 | (1.15) | 3.33 | (1.15) |
| Lifelong learning practices | B | Students learning and/or working during lessons at their own pace | 2.34 | (0.88) | 2.48 | (0.85) | 2.03 | (0.82) | 2.24 | (0.78) | 2.00 | (1.00) | 2.00 | (0.00) |
| | D | Give presentations | 2.80 | (0.75) | 2.65 | (0.80) | 2.49 | (0.85) | 2.26 | (0.75) | 2.00 | (0.00) | 2.00 | (1.00) |
| | E | Determine own content goals for learning (e.g., theme/topic for project) | 2.22 | (0.85) | 2.25 | (0.84) | 1.94 | (0.76) | 1.91 | (0.71) | 2.33 | (0.58) | 2.33 | (1.53) |
| | F | Explain and discuss own ideas with teacher and peers | 2.85 | (0.79) | 2.75 | (0.84) | 2.71 | (0.83) | 2.32 | (0.64) | 2.33 | (0.58) | 2.33 | (1.53) |
| | I | Self and/or peer evaluation | 2.51 | (0.84) | 2.35 | (0.86) | 2.17 | (0.86) | 1.79 | (0.81) | 2.33 | (0.58) | 2.33 | (1.53) |
| | J | Reflect on own learning experience review (e.g., writing a learning log) and adjust own learning strategy | 2.00 | (0.97) | 1.98 | (0.95) | 1.97 | (0.86) | 1.85 | (0.82) | 1.67 | (0.58) | 2.00 | (1.00) |
| Connectedness practices | G | Collaborate with peers from other schools within and/or outside the country | 1.49 | (0.81) | 1.63 | (0.90) | 1.60 | (0.88) | 1.53 | (0.79) | 1.33 | (0.58) | 2.00 | (1.00) |
| | K | Communicate with outside parties (e.g., with experts) experts/mentors | 1.66 | (0.76) | 1.65 | (0.80) | 1.60 | (0.77) | 1.41 | (0.74) | 1.33 | (0.58) | 1.67 | (0.58) |
| | L | Contribute to the community through their own learning activities (e.g., by conducting an environmental protection project) | 1.61 | (0.67) | 1.88 | (0.91) | 1.49 | (0.70) | 1.68 | (0.73) | 1.33 | (0.58) | 1.33 | (0.58) |
| N | | | 41 | | 40 | | 35 | | 34 | | 3 | | 3 | |

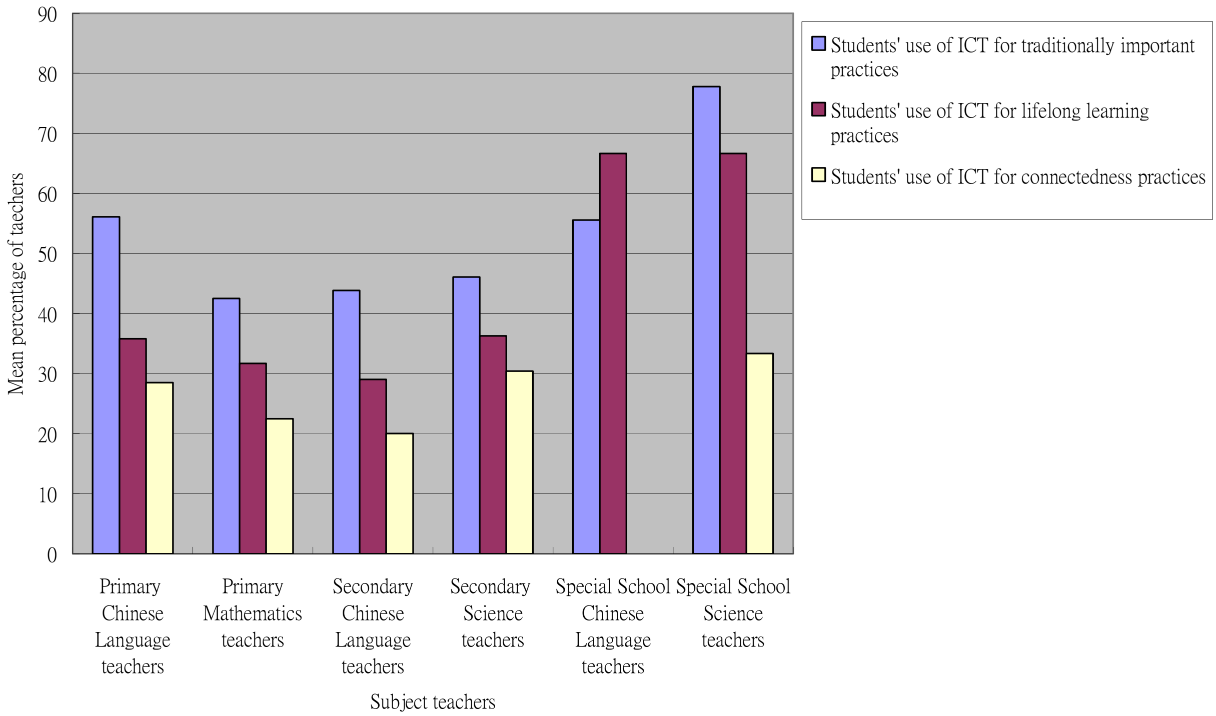



*Figure 9.9 Mean percentages of teachers indicating that ICT was used for the three categories of student practices*

### 9.2.5 Impact of ICT Use

Result from Q16 indicated that over 77% of the teachers reported having used ICT in teaching and learning in the target classes for all the three school types.' In Q18, teachers were further asked to respond on "to what extent has the use of ICT impacted their students in the target class" and a total of 15 items were listed for their indication. Teachers were asked to rank "the extent" in a 5-point Likert scale where "1=Decreased a lot", "2=Decreased a little", "3=No impact", "4=Increased a little" and "5=Increased a lot". These 15 items were classified into 8 indicators as indicated in Figure 9.10.

The primary Mathematics teachers, secondary Science, secondary Chinese Language teachers and special school Science teachers perceived that ICT had greater impact on "traditionally important aspects", "inquiry skills" and "ICT skills". For the primary Chinese Language teachers, they perceived ICT had greater impact on "inquiry Skills", "collaboration" and "ICT skills". Chinese Language teachers of the special schools indicated similar weighting of the impact of ICT use on "traditionally important aspect", "ICT skills", "own pace", "achievement gap" and "socioeconomic divide". Teachers of primary schools and secondary Chinese Language teachers considered that ICT had the least impact on "socioeconomic divide". However, Science teachers of both the special schools and secondary schools perceived that ICT had the least impact on "achievement gap" and Chinese Language teachers of the special schools indicated that ICT had smaller impact on "inquiry skills" and "collaboration".

| Indicators | | Impacts of ICT Use |
|---|---|---|
| Traditionally Important Aspects | A | Subject matter knowledge |
| | N | Assessment results |
| | B | Learning motivation |
| Inquiry Skills | C | Information-handling skills |
| | D | Problem-solving skills |
| | E | Self-directed learning skills |
| Collaboration | F | Collaborative skills |
| | G | Communication skills |
| ICT Skills | H | ICT skills |
| Own Pace | I | Ability to learn at their own pace |
| Affective Impact | J | Self esteem |
| | L | Time spent on learning |
| | M | School attendance |
| Achievement Gap | K | Achievement gap among students |
| Socioeconomic Divide | O | Digital divide (i.e. inequity between students from different socioeconomic backgrounds) |

*Figure 9.10 List of items on impact of ICT used (Q18 of Teacher Questionnaire)*

*Table 9.17 Mean scores of ICT impact on students as perceived by teachers*

| Impact | Primary Schools Chinese Language Teachers | | Primary Schools Mathematics Teachers | | Secondary Schools Chinese Language Teachers | | Secondary Schools Science Teachers | | Special Schools Chinese Language Teachers | | Special Schools Science Teachers | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| Traditionally Important Aspects | 3.71 | (0.45) | 3.80 | (0.47) | 3.64 | (0.45) | 3.63 | (0.52) | 3.67 | (0.33) | 3.78 | (0.38) |
| Inquiry Skills | 3.94 | (0.45) | 4.05 | (0.52) | 3.68 | (0.49) | 3.78 | (0.59) | 3.33 | (0.33) | 4.11 | (0.51) |
| Collaboration | 3.74 | (0.48) | 3.71 | (0.67) | 3.43 | (0.60) | 3.60 | (0.62) | 3.33 | (0.29) | 3.50 | (0.87) |
| ICT Skills | 4.30 | (0.46) | 4.29 | (0.64) | 3.89 | (0.70) | 3.90 | (0.61) | 3.67 | (0.58) | 4.33 | (0.58) |
| Own Pace | 3.65 | (0.62) | 3.77 | (0.62) | 3.48 | (0.58) | 3.53 | (0.68) | 3.67 | (0.58) | 3.67 | (0.58) |
| Affective Impact | 3.61 | (0.38) | 3.65 | (0.57) | 3.50 | (0.34) | 3.45 | (0.51) | 3.42 | (0.29) | 3.67 | (0.14) |
| Achievement Gap | 3.50 | (0.60) | 3.45 | (0.72) | 3.30 | (0.47) | 3.07 | (0.52) | 3.67 | (0.58) | 3.33 | (1.15) |
| Socioeconomic Divide | 3.38 | (0.67) | 3.42 | (0.89) | 3.26 | (0.71) | 2.73 | (0.78) | 3.67 | (0.33) | 3.67 | (0.58) |
| N | 41 | | 31 | | 27 | | 30 | | 3 | | 3 | |

### 9.2.6 Teachers' Self-proclaimed Competences in Uses of ICT

In Q19 of Teacher Questionnaire, teachers were asked to report their competence in two broad categories of ICT use. They were “general use of ICT” and “pedagogical use of ICT”. 9 specific competences were included in the “general use of ICT” category and 8 specific competences were included in the “pedagogical use of ICT” category. Teachers were asked to rank in a 4-point scale (1=Not at all, 2=A little, 3=Somewhat, 4=A lot) their levels of self-proclaimed competences in using ICT. Figure 9.11 shows the details of the list of competences.

| | |
|---|---|
| **General use of ICT** | |
| A | I can produce a letter using a word-processing program. |
| B | I can e-mail a file (e.g., the notes of a meeting) to a colleague. |
| C | I can take photos and show them on the computer. |
| D | I can file electronic documents in folders and sub-folders on the computer. |
| E | I can use a spreadsheet program for budgeting or student administration. |
| F | I can share knowledge and experiences with others in a discussion forum/user group on the Internet. |
| G | I can produce presentations with simple animation functions. |
| H | I can use the Internet for online purchases and payments. |
| I | I can do Chinese keyboard input. |
| **Pedagogical use of ICT** | |
| J | I can prepare lessons that involve the use of ICT by students. |
| K | I know which teaching/learning situations are suitable for ICT use. |
| L | I can find useful curriculum resources on the Internet. |
| M | I can use ICT for monitoring students' progress and evaluating learning outcomes. |
| N | I can use ICT to give effective presentations/ explanations. |
| O | I can use ICT for collaboration with others. |
| P | I can install educational software on my computer. |
| Q | I can use the Internet (e.g., select suitable websites and user groups/discussion forums) to support student learning. |

*Figure 9.11 List of self-proclaimed competences in uses of ICT (Q19 of Teacher Questionnaire)*

Table 9.18 presents the results of the self-proclaimed competences as perceived by teachers. It was delighted to note that all teachers’ mean scores for both “general use of ICT” and “pedagogical use of ICT” were above 3, i.e. they perceived their competences as up to “somewhat” level. It is noteworthy that the mean scores of “general use of ICT” of all teachers were slightly higher than those of “pedagogical use of ICT”. In the primary schools, Chinese Language teachers’ self-proclaimed competence levels in “general use of ICT” and the “pedagogical use of ICT” were higher than those of Mathematics teachers. In the secondary schools, Science teachers’ self-proclaimed competences in both “general use of ICT” and “pedagogical use of ICT” were also higher than those of the Chinese Language teachers. For the special schools, Chinese Language teachers’ self-proclaimed competences in “general use of ICT” were slightly lower than those of Science teachers of the special schools. However, for the “pedagogical use of ICT”, the result was vice-versa.

*Table 9.18 Mean scores of self-proclaimed competences as perceived by teachers*

| **Competences** | **Primary Schools Chinese Language Teachers** | | **Primary Schools Mathematics Teachers** | | **Secondary Schools Chinese Language Teachers** | | **Secondary Schools Science Teachers** | | **Special Schools Chinese Language Teachers** | | **Special Schools Science Teachers** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| General use of ICT | 3.40 | (0.53) | 3.33 | (0.81) | 3.44 | (0.65) | 3.59 | (0.53) | 3.56 | (0.48) | 3.59 | (0.53) |
| Pedagogical Use of ICT | 3.14 | (0.56) | 3.11 | (0.76) | 3.11 | (0.76) | 3.27 | (0.51) | 3.50 | (0.45) | 3.21 | (0.71) |
| N | 40 | | 31 | | 27 | | 30 | | 3 | | 3 | |

### 9.2.7 Obstacles in Using ICT

In Q21 of Teacher Questionnaire, teachers were asked to indicate the obstacles, as presented in Figure 9.12, encountered in using ICT in their teaching. Results were shown in Figure 9.13 and 9.14. As shown in Figure 9.13, teachers of the primary and secondary schools did not perceive the listed items as serious obstacles (less than 40% of the teachers reported that they had experienced those obstacles) except the one “did not have the time necessary to develop and implement the activities” (item H), which was perceived as the commonly found obstacle by teachers. The percentages of teachers who encountered the problem as described in the item were 75.61%, 45.00%, 62.86% and 38.24% as reported by the primary Chinese Language teachers, primary Mathematics teachers, secondary Chinese Language teachers and secondary Science teachers respectively.

On the other hand, the situation reported by Science teachers of the special schools was not optimistic as shown in Figure 9.14. 10 out of the 13 listed obstacles were reported and all respective percentages were over 60. Despite of such results, the situation of Chinese Language teachers of the special schools seemed to be much better. No obstacles were reported in the following items:

- I do not know how to identify which ICT tools will be useful. (item I)
- My school lacks digital learning resources. (item J)
- I do not have the flexibility to make my own decisions when planning lessons with ICT. (item K)
- I do not have access to ICT outside school. (item L)
- I have difficulties in Chinese input. (item M)

| Category | | Obstacles listed in Teacher Questionnaire |
|---|---|---|
| School-related | A | ICT is not considered to be useful in my school. |
| | B | My school does not have the required ICT infrastructure. |
| | J | My school lacks digital learning resources. |
| | K | I do not have the flexibility to make my own decisions when planning lessons with ICT. |
| | L | I do not have access to ICT outside school. |
| Teacher-related | C | I do not have the required ICT-related skills. |
| | D | I do not have the necessary ICT-related pedagogical skills. |
| | E | I do not have sufficient confidence to try new approaches alone. |
| | H | I do not have the time necessary to develop and implement the activities. |
| | I | I do not know how to identify which ICT tools will be useful. |
| | M | I have difficulties in Chinese input. |
| Student-related | F | My students do not possess the required ICT skills. |
| | G | My students do not have access to the required ICT tools outside school premises. |

*Figure 9.12 List of obstacles encountered by teachers in using ICT in teaching (Q21 of Teacher Questionnaire)*

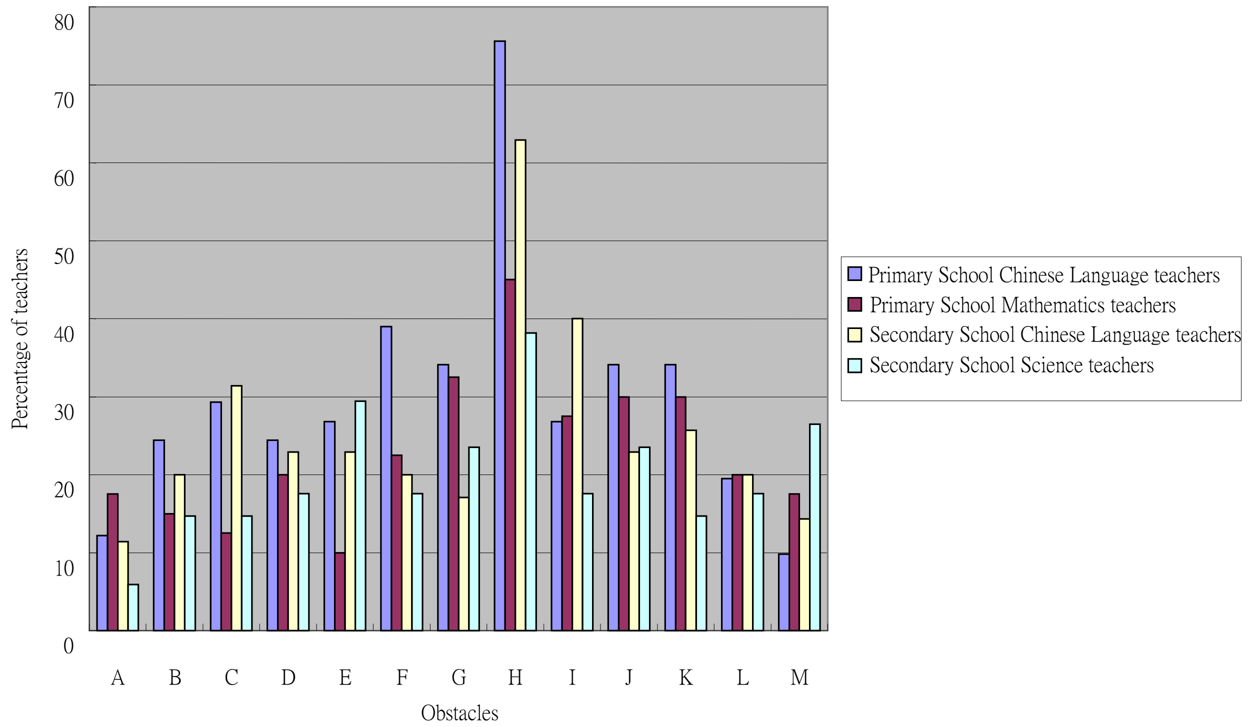



*Figure 9.13 Obstacles encountered by teachers of the primary and secondary schools*

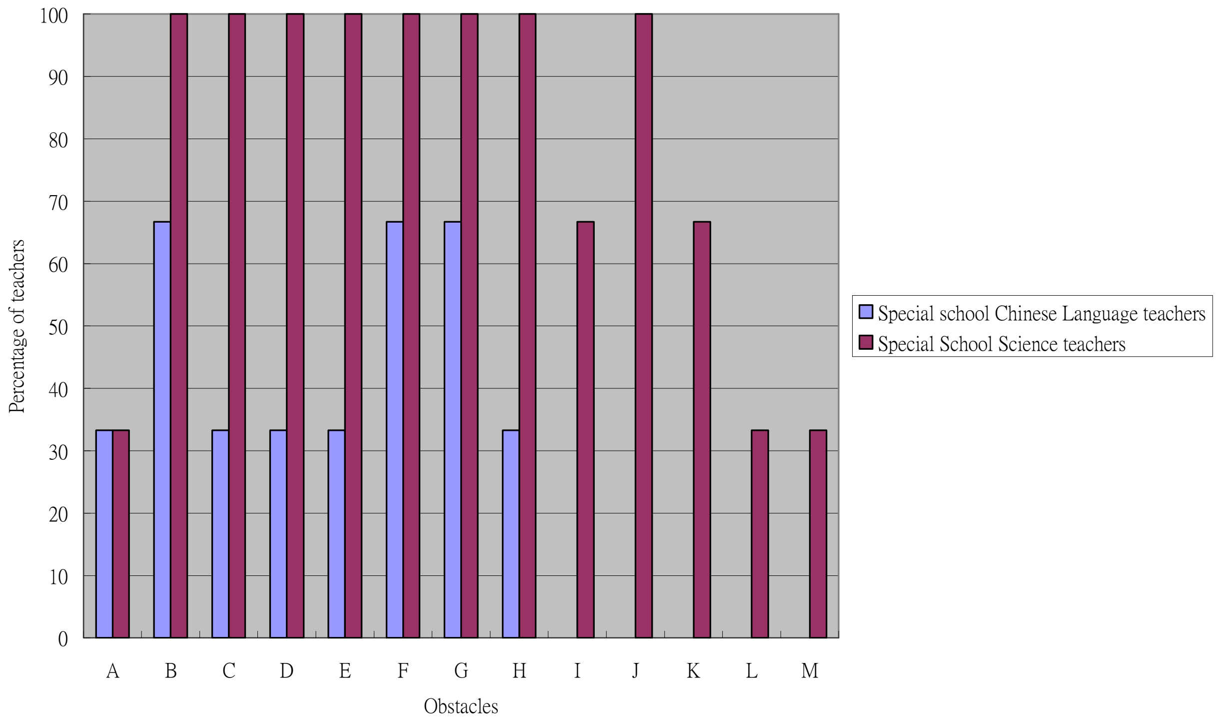



*Figure 9.14 Obstacles encountered by teachers of the special schools*

*Table 9.19 Percentage of teachers indicated that they have encountered the three kinds of obstacles in using ICT in their teaching*

| **Obstacles** | **Mean Percentage (%)** | | | | | |
|---|---|---|---|---|---|---|
| | **Primary Schools Chinese Language Teachers** | **Primary Schools Mathematics Teachers** | **Secondary Schools Chinese Language Teachers** | **Secondary Schools Science Teachers** | **Special Schools Chinese Language Teachers** | **Special Schools Science Teachers** |
| School related obstacles | 25 | 23 | 20 | 15 | 20 | 67 |
| Teacher related obstacles | 32 | 22 | 32 | 24 | 22 | 83 |
| Student related obstacles | 37 | 28 | 19 | 21 | 67 | 100 |
| N | 41 | 40 | 35 | 34 | 3 | 3 |

In sum, Chinese Language and Science teachers of the secondary schools indicated that “teacher-related obstacles” were most frequently encountered whereas the primary Mathematics teachers, primary Chinese Language teachers as well as Chinese Language and Science teachers of the special schools claimed that “student-related obstacles” were frequently encountered.

## 9.3 General findings of IT Coordinator Questionnaire

In this study, IT Coordinator (ITC) Questionnaire was designed to collect information on the resources and support in schools. The information including the ICT in schools, resource materials and hardware, as well as obstacles and support facilities for ICT were collected. There were 19 questions in this questionnaire. A total of 38 primary school ITCs, 33 secondary school ITCs and 4 special school ITCs participated in this study. In this section, some main findings were presented. For the detailed descriptive statistics, please refer to Annexes 3a, 3b and 3c.

### 9.3.1 Availability of Technology-related Resources

In Q4, ITCs were asked to indicate the availability of different types of technology-related resources in schools.

As shown in Table 9.20, several technology-related resources were highly available in the primary schools. They were “general office suite” (item C in Table 9.20) (92.11%), “mail accounts for teachers” (item K) (86.84%), “communication software” (item F) (81.58%), “multimedia production tool” (item D) (81.58%), “equipment and hands-on materials” (item A) (78.95%), “digital resources” (item G) (78.95%) and “mail accounts for students” (item L) (78.95). On the other hand, “mobile devices” (item H) (18.42%) and “smart board” (item I) (10.53%) were the applications of lower availability in the primary schools.

*Table 9.20 Percentage of availability of technology-related resources as indicated by ITCs of the primary schools (Q4 of ITC Questionnaire)*

| **Technology-related resources** | | **Available (%)** | **Not available (%)** | |
|---|---|---|---|---|
| | | | **Needed** | **Not needed** |
| A | Equipment and hands-on materials (e.g., laboratory equipment, musical instruments, art materials, overhead projectors, slide projectors and electronic calculators) | 78.95 | 21.05 | 0.00 |
| B | Tutorial/exercise software | 68.42 | 28.95 | 2.63 |
| C | General office suite (e.g., word-processing, database, spreadsheet and presentation software) | 92.11 | 7.89 | 0.00 |
| D | Multimedia production tools (e.g., media capture and editing equipment, drawing programs and webpage/multimedia production tools) | 81.58 | 15.79 | 2.63 |
| E | Simulations/modeling software/digital learning games | 36.84 | 52.63 | 10.53 |
| F | Communication software (e.g., e-mail, chat and discussion forum) | 81.58 | 13.16 | 5.26 |
| G | Digital resources (e.g., portal, dictionaries and encyclopedia) | 78.95 | 21.05 | 0.00 |
| H | Mobile devices [e.g., Personal Digital Assistant (PDA), mobile phone, and pocket PC] | 18.42 | 50.00 | 31.58 |
| I | Smart board/interactive whiteboard | 10.53 | 76.32 | 13.16 |
| J | Learning management system (e.g., WebCT/iClassroom/eSchool/My-IT-School) | 76.32 | 23.68 | 0.00 |
| K | Mail accounts for teachers | 86.84 | 10.53 | 2.63 |
| L | Mail accounts for students | 78.95 | 18.42 | 2.63 |

N=38

N.B. - Figures may not sum to 100 percent because of rounding.

In secondary schools, “equipment and hands-on materials” (item A in Table 9.21a) (100%) and “general office suite” (item C) (100%) were reported as available in schools by all ITCs of the secondary schools. Besides, “communication software” (item G) (93.94%), “mail accounts for teachers” (item L) (93.94%), “multimedia production tools” (item D) (90.91%), “digital resources” (item H) (90.91%) and “learning management system” (item K) (90.91%) were the applications which were highly available in the secondary schools. Similar to the situation in the primary schools, “mobile devices” (item I) (28.13%) and “smart board” (item J) (27.27%) were the applications with lower availability in the secondary schools.

For special schools, the availability of technology-related resources was highly different from that of the primary and secondary schools. Table 9.21b indicated that “general office suite” (item C in Table 9.21) (100%), “multimedia production tools” (item D) (100%), “communication software” (item G) (100%) and “mail accounts for teachers” (item L) (100%) were the applications which were available in the special schools. Comparing Table 9.21a and Table 9.21b, quite a number of technology-related resources were available in the secondary schools, but were not available in the special schools such as "data-logging tools" (item E), "simulations/modeling software/digital learning games" (item F) and "mobile devices" (item I) were the applications which were not available but were necessary in the special schools.

*Table 9.21a Percentage of availability of technology-related resources as indicated by ITCs of the secondary schools (Q4 of ITC Questionnaire)*

| **Technology-related resources** | | **Available (%)** | **Not available (%)** | |
|---|---|---|---|---|
| | | | **Needed** | **Not needed** |
| A | Equipment and hands-on materials (e.g., laboratory equipment, musical instruments, art materials, overhead projectors, slide projectors and electronic calculators) | 100.00 | 0.00 | 0.00 |
| B | Tutorial/exercise software | 72.73 | 24.24 | 3.03 |
| C | General office suite (e.g., word-processing, database, spreadsheet and presentation software) | 100.00 | 0.00 | 0.00 |
| D | Multimedia production tools (e.g., media capture and editing equipment, drawing programs and webpage/multimedia production too | 90.91 | 9.09 | 0.00 |
| E | Data-logging tools | 78.79 | 18.18 | 3.03 |
| F | Simulations/modeling software/digital learning games | 42.42 | 39.39 | 18.18 |
| G | Communication software (e.g., e-mail, chat and discussion forum) | 93.94 | 6.06 | 0.00 |
| H | Digital resources (e.g., portal, dictionaries and encyclopedia) | 90.91 | 9.09 | 0.00 |
| I | Mobile devices [e.g., Personal Digital Assistant (PDA), mobile phone, and Pocket PC] | 28.13 | 43.75 | 28.13 |
| J | Smart board/interactive whiteboard | 27.27 | 42.42 | 30.30 |
| K | Learning management system (e.g., WebCT/ iClassroom /eSchool /My-IT-School) | 90.91 | 9.09 | 0.00 |
| L | Mail accounts for teachers | 93.94 | 3.03 | 3.03 |
| M | Mail accounts for students | 84.85 | 6.06 | 9.09 |

N=33

N.B. - Figures may not sum to 100 percent because of rounding.

*Table 9.21b Percentage of availability of technology-related resources as indicated by ITCs of the special schools (Q4 of ITC Questionnaire)*

| Technology-related resources | | Available (%) | Not available (%) | |
|---|---|---|---|---|
| | | | **Needed** | **Not needed** |
| A | Equipment and hands-on materials (e.g., laboratory equipment, musical instruments, art materials, overhead projectors, slide projectors and electronic calculators) | 25.00 | 75.00 | 0.00 |
| B | Tutorial/exercise software | 25.00 | 75.00 | 0.00 |
| C | General office suite (e.g., word-processing, database, spreadsheet and presentation software) | 100.00 | 0.00 | 0.00 |
| D | Multimedia production tools (e.g., media capture and editing equipment, drawing programs and webpage/multimedia production too | 100.00 | 0.00 | 0.00 |
| E | Data-logging tools | 0.00 | 75.00 | 25.00 |
| F | Simulations/modeling software/digital learning games | 0.00 | 75.00 | 25.00 |
| G | Communication software (e.g., e-mail, chat and discussion forum) | 100.00 | 0.00 | 0.00 |
| H | Digital resources (e.g., portal, dictionaries and encyclopedia) | 50.00 | 50.00 | 0.00 |
| I | Mobile devices [e.g., Personal Digital Assistant (PDA), mobile phone, and Pocket PC] | 0.00 | 100.00 | 0.00 |
| J | Smart board/interactive whiteboard | 25.00 | 75.00 | 0.00 |
| K | Learning management system (e.g., WebCT/ iClassroom /eSchool /My-IT-School) | 50.00 | 50.00 | 0.00 |
| L | Mail accounts for teachers | 100.00 | 0.00 | 0.00 |
| M | Mail accounts for students | 75.00 | 25.00 | 0.00 |

N=4

N.B. - Figures may not sum to 100 percent because of rounding.

### 9.3.2 Number of Computers for Different Purposes in Schools

In Q5, ITCs were asked to indicate the number of computers for different purposes. Table 9.22 presents the ITCs' responses to the question.

As indicated in Table 9.22, the number of computers in the secondary schools (mean=257.97) was almost two times of those in the primary schools (mean=138.16) and three times of those in the special schools (mean=76.25). It was also found that almost all computers were equipped with CD-ROM and/or DVD and connected to the Internet at the primary, secondary and special schools. Nearly half of the total number of computers in schools was available for students of the three school types. By dividing the total number of computer available to teacher (item C in table 9.22) by the total no of computer available in school(item A in table 9.22), we found that the special schools provided higher percentages of computers (43.61%) to teachers than those of the primary schools (15.43%) and the secondary schools (25.58%). Only a few number of computers were available to administrative staff in the primary (mean=10.97), secondary (mean=19.94) and special schools (mean=9.00).

*Table 9.22 Mean number of computers for different purposes as indicated by ITCs (Q5 of ITC Questionnaire)*

| No. of Computers | | Primary | | Secondary | | Special | |
|---|---|---|---|---|---|---|---|
| | | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| A | Available in the school altogether? | 138.16 | (67.13) | 257.97 | (81.18) | 76.25 | (24.96) |
| B | Available to students? | 84.05 | (54.59) | 157.82 | (72.07) | 38.50 | (14.46) |
| C | Available only to teachers? | 21.32 | (18.79) | 66.00 | (47.53) | 33.25 | (21.58) |
| D | Available only to administrative staff? | 10.97 | (17.11) | 19.94 | (50.50) | 9.00 | (7.35) |
| E | Connected to the Internet/World Wide Web? | 139.37 | (68.20) | 243.36 | (93.36) | 76.25 | (24.96) |
| F | Connected to a local area network (LAN)? | 135.74 | (70.15) | 251.55 | (82.19) | 76.25 | (24.96) |
| G | Multimedia computers (equipped with a CD-ROM and/or DVD)? | 136.71 | (73.19) | 256.42 | (80.92) | 76.25 | (24.96) |
| N | | 38 | | 33 | | 4 | |

### 9.3.3 Number of Laptops in Schools

In Q6, ITCs were asked to indicate the number of laptops in their schools. Table 9.23 presents the ITCs' responses to this question.

As shown in Table 9.23, the number of laptops in the secondary schools (mean=58.3) was much greater than those in the primary (mean=12.29) and special (mean=9.25) schools.

*Table 9.23 Mean number of laptops in schools as indicated by ITCs (Q6 of the ITC Questionnaire)*

| Number of Laptops in Schools | | Primary | | Secondary | | Special | |
|---|---|---|---|---|---|---|---|
| | | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| 6. | How many of the computers in your school are laptops? | 12.29 | (11.11) | 58.30 | (36.16) | 9.25 | (6.65) |
| N | | 38 | | 33 | | 4 | |

### 9.3.4 Quantity of Different Technological Equipment in Schools

In Q7, ITCs were asked to indicate the quantity of different types of technological equipment in schools. In this question, four types of equipment were asked. They were "PDA and smartphones" (item A), "calculators" (item B), "Smart boards" (item C) and "projectors for presentation of digital materials" (item D). Table 9.24 presents the ITCs' responses to this question.

As indicated in Table 9.24, "projectors for presentation of digital materials" (item D) was the most common type of technological equipment at the primary (mean=25.42), secondary (mean=36.21) and special schools (mean=8.5). Besides, "calculators" (item B) were only commonly found in the primary schools (mean=25.95). For “PDAs and smartphones” (item A) and “smartboards” (item C), the mean numbers were less than two across the 3 school types.

*Table 9.24 Mean number of technological equipment in schools as indicated by ITCs (Q7 of ITC Questionnaire)*

| Types of Technological equipment | | Primary | | Secondary | | Special | |
|---|---|---|---|---|---|---|---|
| | | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| A | PDAs and smartphones (phone integrated with PDA) | 0.50 | (1.89) | 0.55 | (1.77) | 0.00 | (0.00) |
| B | Calculators | 25.95 | (47.46) | 0.45 | (1.92) | 0.00 | (0.00) |
| C | Smartboards (interactive whiteboard system) | 0.34 | (0.94) | 1.58 | (6.13) | 0.25 | (0.50) |
| D | Projectors for presentation of digital materials | 25.42 | (12.20) | 36.21 | (10.65) | 8.50 | (6.24) |
| N | | 38 | | 33 | | 4 | |

### 9.3.5 Availability of Technical Support in Schools

In Q16, ITCs were asked to indicate the level of technical support in schools if teachers wanted to use ICT for a list of 13 activities. The question was designed with a 4-point scale where “1=No support”, “2=Some support”, “3=Extensive support” and “4=Not applicable”. Table 9.25 presents the ITCs’ response to this question.

As shown in Table 9.25a, for the primary schools, most extensive technical support was available to teachers for “assigning extended projects” (item A in Table 9.25a) (60.53%), “assigning short-task projects” (item B) (68.42%), “involving students in self-accessed courses and/or learning activities” (item D) (65.79%) and “introducing students to useful online language resources such as digital dictionaries and translation software” (item M) (68.42%). Less than 8% of the ITCs indicated that there was no support to the listed activities.

For secondary schools, most extensive technical support was available to teachers for “assigning short-task projects” (item B in Table 9.25b) (66.67%), “assigning production projects” (item C) (51.52%) and “involving students in self-accessed courses and/or learning activities (item D) (54.55%). A much higher percentage (18.18%) of ICT coordinators indicated that there was no support available for the activity “involving students in studying natural phenomena through simulations” (item J)

For special schools, most extensive technical support was available to teachers for “assigning production projects” (item C in Table 9.25c) (75%), “involving students in self-accessed courses and/or learning activities” (item D) (75%), “using multimedia in teaching subject-specific concepts” (item L) (75%), and “introducing students to useful online language resources such as digital dictionaries and translation software” (item M) (75%). However, the percentages indicating items of which support was not applicable were also high when comparing with those of primary and secondary schools.

*Table 9.25a Percentage of ITCs indicating different levels of technical support available in primary schools (Q16 of ITC Questionnaire)*

| **Types of activities** | | **No support (%)** | **Some support (%)** | **Extensive support (%)** | **Not applicable (%)** |
|---|---|---|---|---|---|
| A | Assigning extended projects (2 weeks or longer) | 5.26 | 21.05 | 60.53 | 13.16 |
| B | Assigning short-task projects | 2.63 | 23.68 | 68.42 | 5.26 |
| C | Assigning production projects (e.g., making models or reports) | 2.63 | 34.21 | 52.63 | 10.53 |
| D | Involving students in self-accessed courses and/or learning activities | 0.00 | 34.21 | 65.79 | 0.00 |
| E | Involving students in Mathematical investigations (open-ended) | 2.63 | 50.00 | 39.47 | 7.89 |
| F | Undertaking field study activities | 2.63 | 44.74 | 34.21 | 18.42 |
| G | Using visualization tools to help in understanding mathematical concepts | 2.63 | 44.74 | 36.84 | 15.79 |
| H | Applying exercises to practice skills and procedures | 5.26 | 39.47 | 47.37 | 7.89 |
| I | Involving students in laboratory experiments with clear instructions and well-defined outcomes | 5.26 | 39.47 | 36.84 | 18.42 |
| J | Involving students in studying natural phenomena through simulations | 7.89 | 44.74 | 23.68 | 23.68 |
| K | Involving students in processing and analyzing data | 5.26 | 34.21 | 47.37 | 13.16 |
| L | Using multimedia in teaching subject-specific concepts | 2.63 | 36.84 | 55.26 | 5.26 |
| M | Introducing students to useful online language resources such as digital dictionaries and translation software | 0.00 | 28.95 | 68.42 | 2.63 |

N=38

N.B. - Figures may not sum to 100 percent because of rounding.

*Table 9.25b Percentage of ITCs indicating different levels of technical support available in secondary schools (Q16 of ITC Questionnaire)*

| Types of activities | | No support (%) | Some support (%) | Extensive support (%) | Not applicable (%) |
|---|---|---|---|---|---|
| A | Assigning extended projects (2 weeks or longer) | 0.00 | 45.45 | 48.48 | 6.06 |
| B | Assigning short-task projects | 0.00 | 27.27 | 66.67 | 6.06 |
| C | Assigning production projects (e.g., making models or reports) | 0.00 | 45.45 | 51.52 | 3.03 |
| D | Involving students in self-accessed courses and/or learning activities | 3.03 | 42.42 | 54.55 | 0.00 |
| E | Involving students in Mathematical investigations (open-ended) | 0.00 | 42.42 | 45.45 | 12.12 |
| F | Undertaking field study activities | 6.06 | 54.55 | 27.27 | 12.12 |
| G | Using visualization tools to help in understanding mathematical concepts | 9.09 | 57.58 | 21.21 | 12.12 |
| H | Applying exercises to practice skills and procedures | 6.06 | 48.48 | 33.33 | 12.12 |
| I | Involving students in laboratory experiments with clear instructions and well-defined outcomes | 3.03 | 57.58 | 27.27 | 12.12 |
| J | Involving students in studying natural phenomena through simulations | 18.18 | 54.55 | 12.12 | 15.15 |
| K | Involving students in processing and analyzing data | 0.00 | 60.61 | 36.36 | 3.03 |
| L | Using multimedia in teaching subject-specific concepts | 3.03 | 48.48 | 39.39 | 9.09 |
| M | Introducing students to useful online language resources such as digital dictionaries and translation software | 6.06 | 54.55 | 33.33 | 6.06 |

N=33

N.B. - Figures may not sum to 100 percent because of rounding.

*Table 9.25c Percentage of ITCs indicating different levels of technical support available in special schools (Q16 of ITC Questionnaire)*

| Types of activities | | No support (%) | Some support (%) | Extensive support (%) | Not applicable (%) |
|---|---|---|---|---|---|
| A | Assigning extended projects (2 weeks or longer) | 0.00 | 75.00 | 25.00 | 0.00 |
| B | Assigning short-task projects | 0.00 | 50.00 | 50.00 | 0.00 |
| C | Assigning production projects (e.g., making models or reports) | 0.00 | 25.00 | 75.00 | 0.00 |
| D | Involving students in self-accessed courses and/or learning activities | 0.00 | 25.00 | 75.00 | 0.00 |
| E | Involving students in Mathematical investigations (open-ended) | 0.00 | 50.00 | 50.00 | 0.00 |
| F | Undertaking field study activities | 0.00 | 25.00 | 25.00 | 50.00 |
| G | Using visualization tools to help in understanding mathematical concepts | 0.00 | 25.00 | 25.00 | 50.00 |
| H | Applying exercises to practice skills and procedures | 0.00 | 25.00 | 50.00 | 25.00 |
| I | Involving students in laboratory experiments with clear instructions and well-defined outcomes | 0.00 | 0.00 | 50.00 | 50.00 |
| J | Involving students in studying natural phenomena through simulations | 0.00 | 0.00 | 25.00 | 75.00 |
| K | Involving students in processing and analyzing data | 0.00 | 25.00 | 50.00 | 25.00 |
| L | Using multimedia in teaching subject-specific concepts | 0.00 | 25.00 | 75.00 | 0.00 |
| M | Introducing students to useful online language resources such as digital dictionaries and translation software | 0.00 | 25.00 | 75.00 | 0.00 |

N=4

N.B. - Figures may not sum to 100 percent because of rounding.

## 9.4 General Findings of Student Questionnaire

Student Questionnaire was designed to collect a more comprehensive picture of students' usage of ICT. It included some background information of the students, the usage of computer at home and in school, learning and teaching practices in relation to Mathematics and Chinese Language lessons for the primary school students as well as Chinese Language and Science lessons for students in the secondary and special schools. There were 31 questions in this questionnaire. A total of 1227 primary school students, 1237 secondary school students and 33 special school students took part in the survey and the main findings were presented below. For detailed descriptive statistics, please refer to Annexes 4a, 4b, and 4c.

### 9.4.1 Years of Computer Use

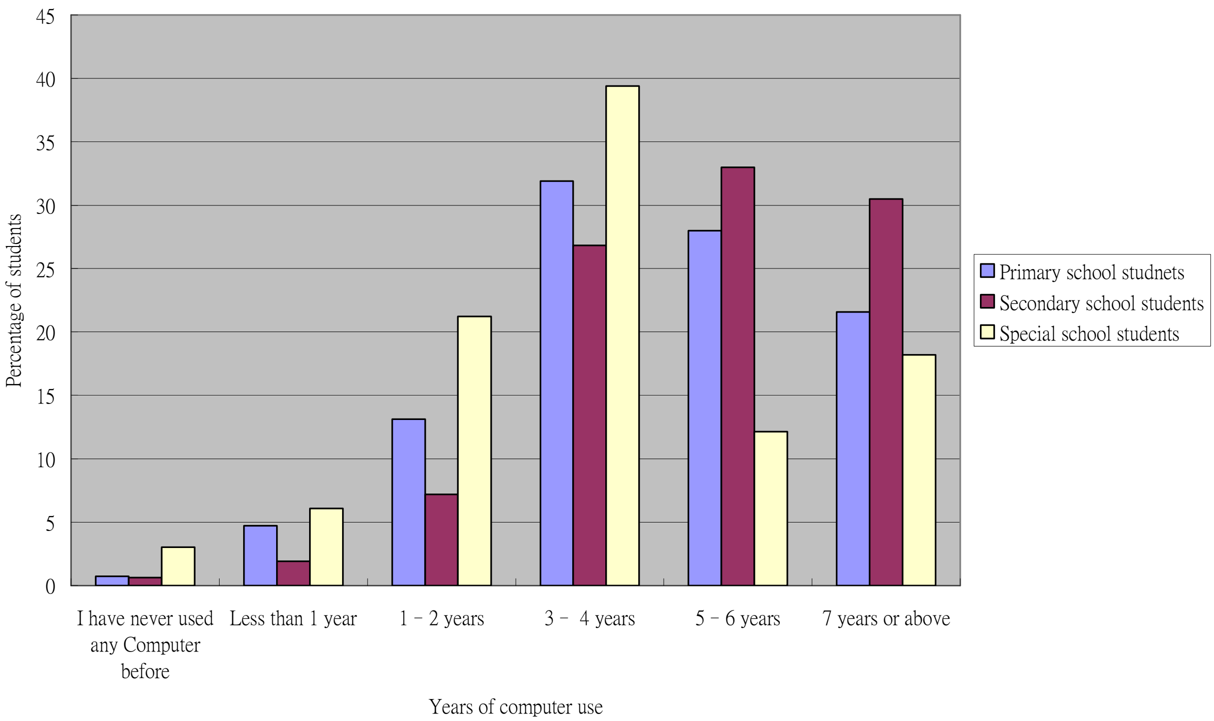



*Figure 9.15 Years of experience in using computer*

In Q3, students were asked to indicate their experience in using computer. As indicated in Figure 9.15, most of the primary school students (31.90%) and the special school students (39.39%) reported that they had 3 to 4 years of experience in using computer. Around 33% of students in the secondary schools indicated that they had 5 to 6 years of experience in using computer. Over 18% of students of all the 3 school types reported that they had 7 years or above experience in using computer.

### 9.4.2 Access to Computer at Home

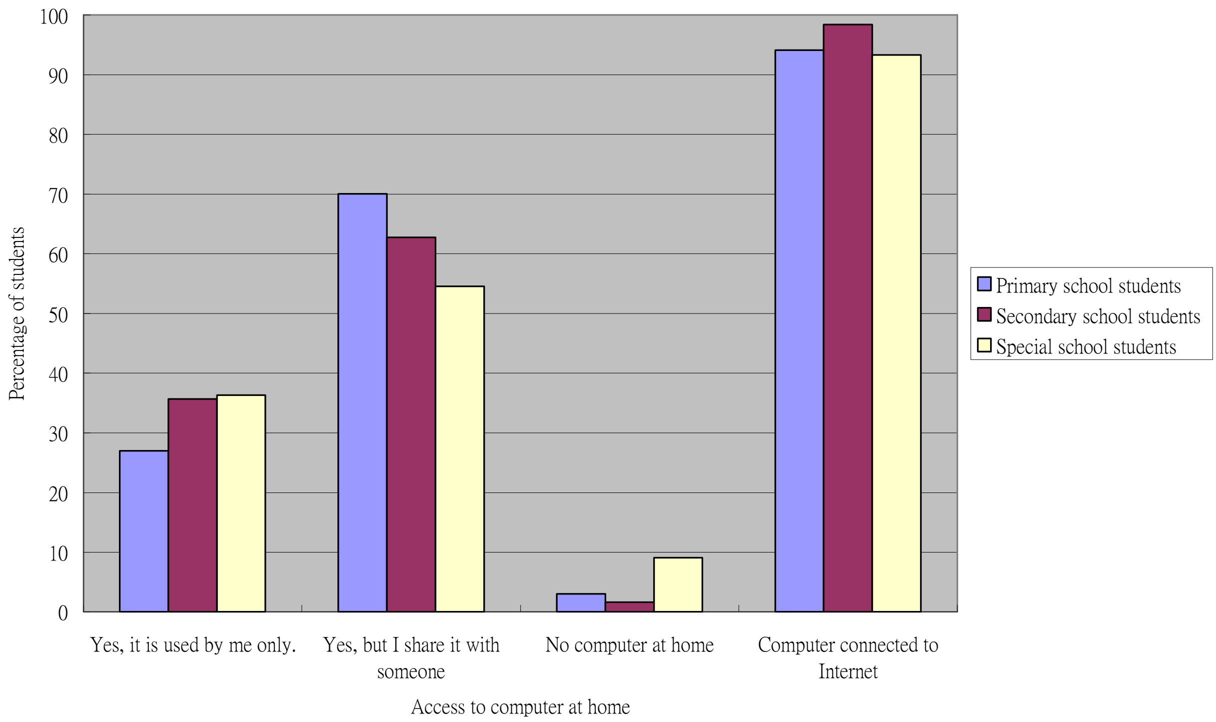



*Figure 9.16 Computer and Internet access at home*

As shown in Figure 9.16, less than 10% of the students of the three school types reported that they did not have computer access at home. Most of them indicated that they needed to share the computer with someone at home and over 93% of the students who had computer access at home reported that they had access to the Internet at home.

### 9.4.3 Duration of Daily Computer Use at Home

In Q6, students were asked to report the duration of which they spent on using computer per day at home in the week prior to the conduct of the questionnaire survey. 11.22% of the primary school students, 5.20% of the secondary school students and 23.33% of the special school students reported that they did not spend any time on using computer at home. As shown in Figure 9.17, most of the primary school students (47.58%) spent less than 2 hours on using computer at home per day, whereas most secondary school students (33.61%) and special school students (26.67%) reported that they spent 2 to 4 hours on using computer at home per day. 6.33% of the primary school students, 16.69% of the secondary school students and 20% of the special school students indicated that they had spent more than 7 hours on using computer at home per day.

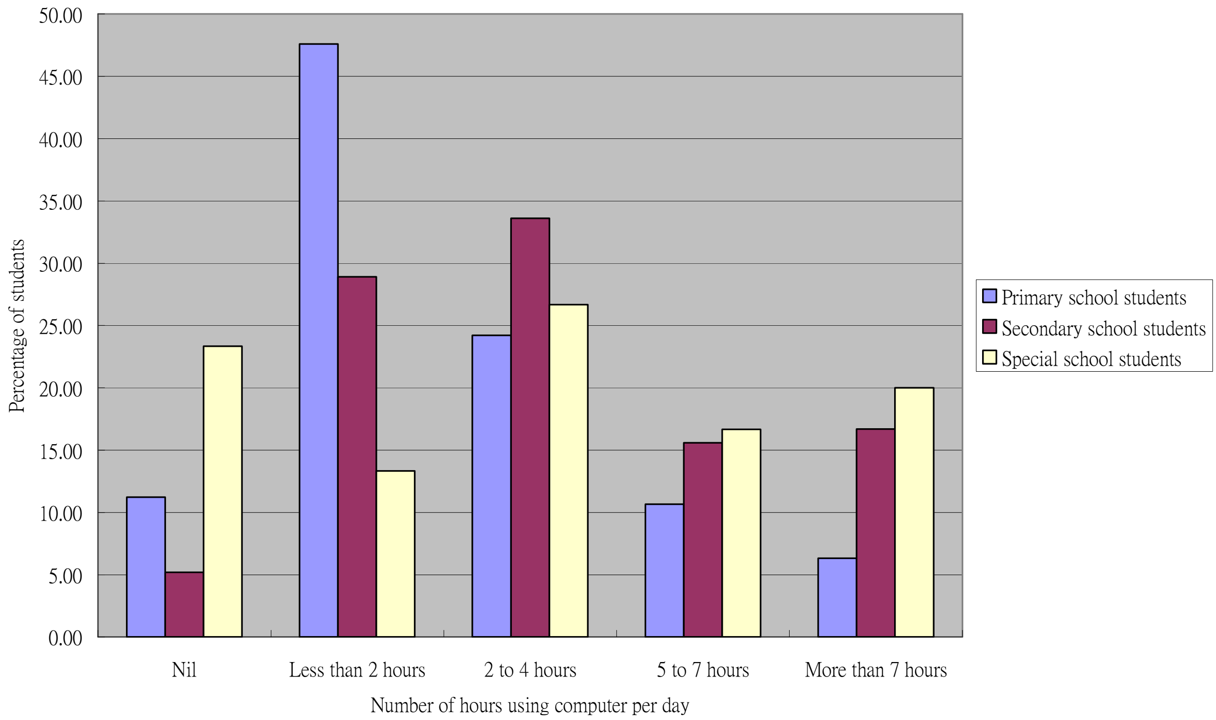



*Figure 9.17 Number of hours using computer per day*

### 9.4.4 Purposes of Using Computer

In Q9, students were asked to rate how often they made use of computers for 12 listed purposes in a 4-point scale where "1=Never", "2=Sometimes, "3=Often" and "4=Nearly always". Table 9.26 presented the results of the students of the 3 school types. The three purposes of using computer as reported by the primary school students were "playing online computer games" (item B in Table 9.26) (mean=2.94), "searching for information for personal interest" (item G) (mean=2.56) and "searching for information for study purposes" (item F) (mean=2.53). For the secondary school students, "online chat" (item I) (mean=3.21), "online entertainment (e.g., music and movies)" (item D) (mean=3.04), and "playing online computer games" (item B) (mean=2.88) were the three more common purposes of using computer. "online entertainment (e.g., music and movies)" (item D) (mean=3.18), "online chat" (item I) (mean=3.15) and "playing online computer games" (item B) (mean=2.94) were the more popular purposes of using computer for the special school students.

Responses of the students from the three school types seemed to indicate that their common purposes of using computer were entertainment and communication.

*Table 9.26 Mean scores of the frequency of using computer for different purposes as rated by students (Q9 of Student Questionnaire)*

| **Purposes of Using Computer** | | **Primary School Students** | | **Secondary School Students** | | **Special School Students** | |
|---|---|---|---|---|---|---|---|
| | | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| A | Doing homework or making notes | 2.46 | (0.95) | 2.47 | (0.82) | 2.03 | (0.95) |
| B | Playing online computer games | 2.94 | (0.94) | 2.88 | (1.02) | 2.94 | (0.93) |
| C | Playing offline computer games | 2.09 | (1.07) | 2.26 | (0.97) | 2.52 | (1.09) |
| D | Online entertainment (e.g., music and movies) | 2.43 | (1.07) | 3.04 | (0.96) | 3.18 | (1.04) |
| E | Offline entertainment (e.g., CD, VCD or DVD) | 2.04 | (1.03) | 2.49 | (1.00) | 2.76 | (0.97) |
| F | Searching for information for study purposes | 2.53 | (0.92) | 2.34 | (0.82) | 2.03 | (0.92) |
| G | Searching for information for personal interest | 2.56 | (1.06) | 2.77 | (0.92) | 2.61 | (0.83) |
| H | Communicating with others using Email | 2.32 | (1.05) | 2.38 | (1.00) | 2.79 | (1.08) |
| I | Online chat (e.g., ICQ and MSN) | 2.26 | (1.23) | 3.21 | (1.02) | 3.15 | (1.23) |
| J | Working on personal web pages (e.g., Writing on Blog) | 1.63 | (1.00) | 2.28 | (1.20) | 2.76 | (1.17) |
| K | Discussion forum | 1.85 | (1.10) | 2.63 | (1.09) | 2.67 | (1.27) |
| L | Other please specify | 1.20 | (0.68) | 1.17 | (0.61) | 1.30 | (0.59) |
| N | | 1227 | | 1234 | | 33 | |

### 9.4.5 Self-proclaimed ICT Competences

In Q10, students were asked to indicate their level of proficiency on 13 technical skills in a 4-point Likert scale where "1=Know nothing at all", "2=Not proficient", "3=Proficient" and "4=Highly proficient". As show in Table 9.27, the top three competences indicated by the primary school students were "online information searching" (item F in Table 9.27) (mean=3.37), "email" (item G) (mean=3.28) and "Chinese hand-writings recognition devices" (item B) (mean=3.25).

Secondary school students claimed higher level of proficiency in "online communications/discussions other than emails" (item H in Table 9.27) (mean=3.28), "online information searching" (item F) (mean=3.27) and "email" (item G) (mean=3.23). For the special school students, the top three competences were "online communications/discussions other than emails" (item H) (mean=3.00), "Chinese hand-writings recognition devices" (item B) (mean=2.91) and "computer graphics" (item I) (mean=2.76).

*Table 9.27 Mean scores of the level of proficiency on the 13 technical skills as indicated by students (Q10 of Student Questionnaire)*

| Type of Technical Skills | | Primary School Students | | Secondary School Students | | Special School Students | |
|---|---|---|---|---|---|---|---|
| | | Mean | (SD) | Mean | (SD) | Mean | (SD) |
| A | Word processing (e.g., MSWORD) | 2.38 | (0.94) | 2.64 | (0.79) | 2.09 | (0.88) |
| B | Chinese hand-writings recognition devices | 3.25 | (0.85) | 3.00 | (0.88) | 2.91 | (1.07) |
| C | Chinese keyboard input | 2.55 | (0.92) | 2.86 | (0.86) | 2.52 | (1.03) |
| D | Spreadsheet (e.g., EXCEL) | 2.57 | (0.98) | 2.64 | (0.75) | 2.33 | (0.92) |
| E | Presentation software (e.g., PowerPoint) | 2.87 | (0.98) | 2.81 | (0.77) | 2.24 | (0.87) |
| F | Online information searching | 3.37 | (0.79) | 3.27 | (0.72) | 2.70 | (0.92) |
| G | Email | 3.28 | (0.90) | 3.23 | (0.77) | 2.73 | (1.04) |
| H | Online communications/discussions other than emails (e.g., ICQ, MSN messenger, discussion forums, Forums and blogs) | 2.75 | (1.16) | 3.28 | (0.85) | 3.00 | (1.00) |
| I | Computer graphics (e.g., drawing and photo editing) | 2.73 | (0.95) | 2.55 | (0.85) | 2.76 | (0.79) |
| J | Video/audio software (e.g., file format conversion and editing) | 2.26 | (1.01) | 2.48 | (0.91) | 2.42 | (0.83) |
| K | Multimedia software (e.g., Flash) | 2.13 | (0.99) | 2.22 | (0.87) | 2.36 | (0.82) |
| L | Web design/editing | 2.05 | (0.99) | 2.19 | (0.85) | 2.45 | (0.83) |
| M | Programming (e.g., Logo and Java) | 1.84 | (0.95) | 1.95 | (0.85) | 2.12 | (0.86) |
| N | | 1227 | | 1234 | | 33 | |

The 13 technical skills were further categorized into three sub-scales. They were “general application tools” (items A, B, C, D and E), “communication tools” (items F, G and H) and “advanced tools” (items I, J, K, L and M) As indicated in Figure 9.18, all students of the three school types claimed that they were more competent in using communication tools and least competent in using advanced ICT tools.

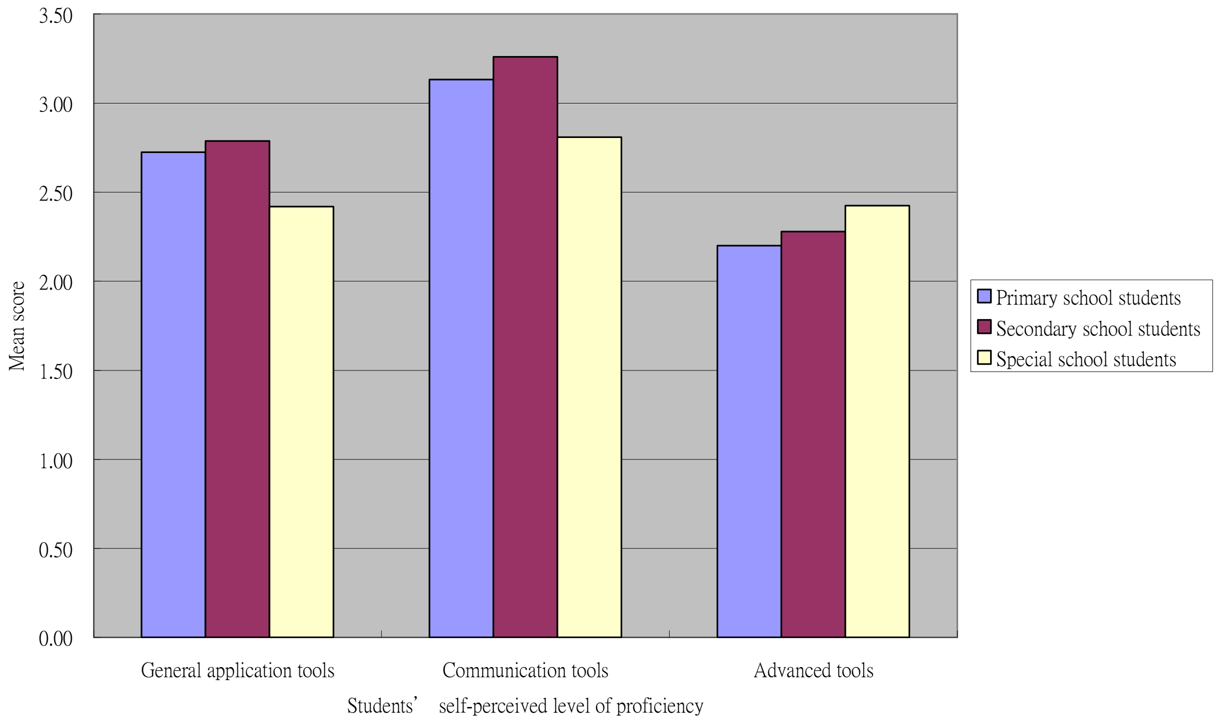



*Figure 9.18 Level of competence in three kinds of ICT usage*

### 9.4.6 Sources of Help when Encountering Difficulties

In Q12, students were asked whether they would seek help from the 11 listed sources or not. As shown in Figure 9.19, most of the students sought help from classmates/friends (Primary: 76.49%, Secondary: 85.17% and Special: 87.88%). The next source was seeking information on the web and the percentages were 73.77%, 79.80% and 69.70% for students of the primary, secondary and special schools respectively. Only a small percentage of the students would seek help from staff of community centers. A very small percentage of students (Primary: 17.07%, Secondary: 2.25% and Special: 6.06%) indicated they would seek help beyond the 10 listed sources such as "looked up reference books" and "asked the online friends". Some students who chose this answer reported that they "tried to solve the problem by themselves first".

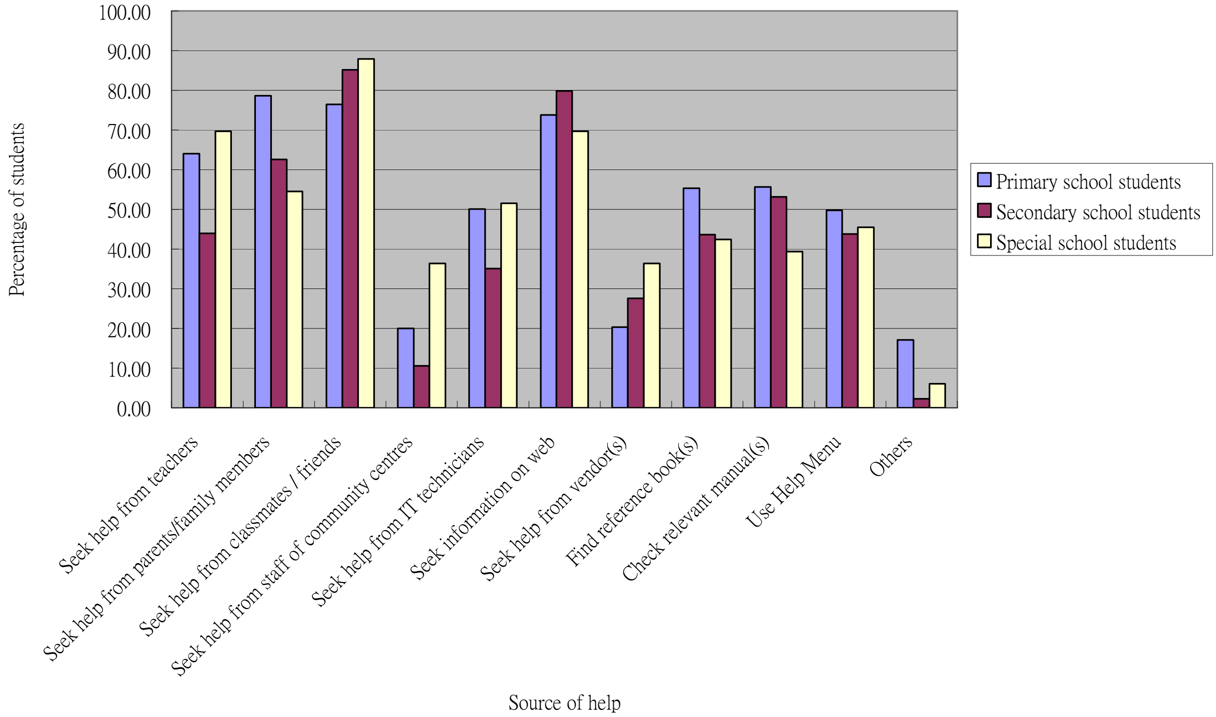



*Figure 9.19 Sources of help when encountering difficulties*

### 9.4.7 General Impact on ICT Use

In Q21, students were asked to indicate the impact of the use of ICT in 9 areas in a 4-point Likert scale ranging from “1=Not at all”, “2=A little”, “3=Somewhat” to “4=A lot”. Table 9.28 presented the mean scores of students’ response.

From Table 9.28, students of the primary and secondary schools indicated that the use of ICT had greater impact on improving their ICT skills (item A) and deepening the understanding of subject matter knowledge (item B). Students in special schools indicated that the improvement in information handling skills (item D) and self-learning skills (item G) were the two areas of greater impact when ICT was used.

*Table 9.28 Impact on the use of ICT (Q21 of Student Questionnaire)*

| Impact on ICT Use | | Primary School Students | | Secondary School Students | | Special School Students | |
|---|---|---|---|---|---|---|---|
| | | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| A | My ICT skills have improved. | 2.74 | (0.90) | 2.72 | (0.81) | 2.36 | (0.86) |
| B | I have deeper understanding of the subject matter knowledge | 2.69 | (0.89) | 2.67 | (0.80) | 2.39 | (0.90) |
| C | I have better examination/test results | 2.33 | (0.91) | 2.28 | (0.81) | 2.45 | (0.94) |
| D | My information-handling skills have improved (e.g., search and analysis) | 2.67 | (0.93) | 2.64 | (0.84) | 2.67 | (0.78) |
| E | My problem-solving skills have improved | 2.59 | (0.93) | 2.58 | (0.84) | 2.45 | (0.87) |
| F | My collaborative and communication skills have improved | 2.54 | (0.95) | 2.55 | (0.89) | 2.42 | (0.83) |
| G | My self-learning skills have improved | 2.65 | (0.93) | 2.64 | (0.85) | 2.61 | (0.86) |
| H | I am more interested in learning | 2.69 | (0.98) | 2.52 | (0.88) | 2.58 | (0.79) |
| I | I am more confident in learning | 2.68 | (0.98) | 2.46 | (0.88) | 2.55 | (0.87) |
| N | | 1227 | | 1234 | | 33 | |

### 9.4.8 Impact on Subject-Specific Content

Students were asked to indicate to what extent the use of computer could help their learning in Mathematics (Q23 for primary schools), Chinese Language (Q25 for primary, secondary and special schools) and Science (Q23 for secondary and special schools) in a 4-point Likert Scale ranging from “1=Not at all”, “2=A little”, “3=Somewhat” to “4=A lot”. Tables 9.37 – 9.39 present the mean scores in Mathematics, Science, primary Chinese Language and secondary Chinese Language respectively.

For Mathematics, students indicated that the use of ICT had a greater impact on “enhance information search” (item D in Table 9.29) (mean=2.62) and “present information effectively” (item J) (mean=2.57) but the impacts on “help to explore the patterns and structure of numbers and shapes” (item B) (mean=2.40) and “encourage sharing of ideas, information and resources via a convenient platform” (item I) (mean=2.41) were relatively smaller.

*Table 9.29 ICT Impact on learning Mathematics (Q23 of Student Questionnaire at primary schools)*

| Types of ICT Impact | | Primary School Students | |
|---|---|---|---|
| | | **Mean** | **(SD)** |
| A | Enhance Mathematical thinking | 2.45 | (0.90) |
| B | Help to explore the patterns and structure of numbers and shapes | 2.40 | (0.91) |
| C | Improve number sense and spatial sense | 2.45 | (0.92) |
| D | Enhance information search | 2.62 | (0.96) |
| E | Help to tackle coursework/homework problems | 2.55 | (0.97) |
| F | Help to summarize and compare information | 2.44 | (0.94) |
| G | Help to collect and analyze data | 2.46 | (0.95) |
| H | Enhance interaction and collaboration amongst peers, teachers and others | 2.45 | (0.94) |
| I | Encourage sharing of ideas, information and resources via a convenient platform | 2.41 | (0.96) |
| J | Present information effectively | 2.57 | (0.97) |
| N | | 1227 | |

For Science, students of the secondary schools and special schools perceived that the use of ICT had larger impact on "collate data in an easier way" (item C in Table 9.30) (mean for secondary school= 2.92, mean for special school=2.42) and "exchange and share information easily" (item G) (mean for secondary school= 2.82, mean for special school=2.42).

*Table 9.30 ICT impact on learning Science (Q23 of Student Questionnaire at secondary and special schools)*

| Types of ICT Impact | | Secondary School Students | | Special School Students | |
|---|---|---|---|---|---|
| | | **Mean** | **(SD)** | **Mean** | **(SD)** |
| A | Get more updated information | 2.81 | (0.90) | 2.30 | (0.92) |
| B | Get more accurate data | 2.74 | (0.87) | 2.39 | (0.86) |
| C | Collate data in an easier way | 2.92 | (0.89) | 2.42 | (0.83) |
| D | Help in understanding complex concepts | 2.73 | (0.87) | 2.39 | (0.93) |
| E | Reduce some manipulative work and provide more room for critical thinking and reflection | 2.73 | (0.89) | 2.24 | (0.97) |
| F | Extend the range of exploratory science through the use of ICT | 2.71 | (0.87) | 2.30 | (0.81) |
| G | Exchange and share information easily | 2.82 | (0.92) | 2.42 | (0.87) |
| | N | 1234 | | 33 | |

For Chinese Language, students were asked to indicate the impact of using ICT on a list of 15 items on learning Chinese Language. Students of the primary schools reflected that the use of ICT had greater impact on exploring different genres of texts (item F in Table 9.31) (mean=2.69) and enhancing reading proficiency (item C) (mean=2.66). A relatively small impact was noted on discussing with teachers via the Internet (item M) (mean=2.27).

For students of the secondary schools, they indicated ICT had great impact on exploring different genres of texts (item F in Table 9.31) (mean=2.65) and learning more words and vocabularies (item A) (mean=2.59) whereas smaller impact was noted on receiving instant feedback from teachers (item N) (mean=2.28). For the special school students, they expressed that ICT had greater impact on searching useful information for Chinese Language learning (item K) (mean=2.61) and learning Chinese Language from one another through sharing personal works (item O) (mean=2.58) but smaller impacts on improving writing ability (item B) (mean=2.36) and learning more words and vocabularies (item A) (mean=2.36) were noted.

*Table 9.31 ICT impact on learning Chinese Language (Q25 of Student Questionnaire for all three school types)*

| | **Types of ICT Impact** | **Primary School Students** | | **Secondary School Students** | | **Special School Students** | |
|---|---|---|---|---|---|---|---|
| | | **Mean** | **(SD)** | **Mean** | **(SD)** | **Mean** | **(SD)** |
| A | Learn more words and vocabularies | 2.59 | (0.95) | 2.59 | (0.85) | 2.36 | (0.86) |
| B | Improve writing ability | 2.53 | (0.93) | 2.45 | (0.85) | 2.36 | (0.82) |
| C | Enhance reading proficiency | 2.66 | (0.94) | 2.58 | (0.86) | 2.48 | (0.94) |
| D | Improve listening ability | 2.58 | (0.95) | 2.53 | (0.88) | 2.39 | (0.93) |
| E | Improve speaking ability | 2.52 | (0.97) | 2.41 | (0.90) | 2.39 | (0.93) |
| F | Explore different genres of texts | 2.69 | (0.95) | 2.65 | (0.88) | 2.48 | (0.94) |
| G | Promote integrative Chinese language skill | 2.60 | (0.95) | 2.57 | (0.87) | 2.52 | (0.91) |
| H | Learn more about Chinese literature (e.g., idioms and stories) | 2.57 | (0.96) | 2.57 | (0.87) | 2.48 | (0.87) |
| I | Acquire accurate Cantonese pronunciation | 2.54 | (0.99) | 2.44 | (0.90) | 2.52 | (0.91) |
| J | Acquire accurate Mandarin pronunciation | 2.49 | (1.01) | 2.42 | (0.90) | 2.39 | (0.90) |
| K | Search useful information for Chinese Learning | 2.56 | (0.97) | 2.54 | (0.88) | 2.61 | (0.86) |
| L | Discuss with classmates via the Internet | 2.38 | (1.01) | 2.45 | (0.93) | 2.48 | (0.94) |
| M | Discuss with teachers via the Internet | 2.27 | (1.01) | 2.29 | (0.92) | 2.39 | (0.79) |
| N | Receive instant feedback from teachers | 2.34 | (1.02) | 2.28 | (0.93) | 2.42 | (1.00) |
| O | Learn Chinese from one another through sharing personal works (e.g., composition and book reviews) | 2.38 | (1.01) | 2.39 | (0.92) | 2.58 | (0.97) |
| N= | | 1227 | | 1234 | | 33 | |

## 9.5 Correlation Analyses of 8 Information Literacy Indicators in Different Key Learning Areas

### 9.5.1 Correlation Analysis of the 8 Information Literacy Indicators in Primary Chinese Language

Individual IL indicator had different levels of correlation with each other in the primary Chinese Language PA and these correlations were statistically significant ($p<0.01$). The “total” score was strongly and positively correlated with the 7 IL dimensions. Except “define”, the correlation coefficients of other dimensions with the “total” score were greater than 0.5. Among the 7 IL dimensions, “access” and “create” had stronger correlations with other dimensions. “Access” and “manage” as well as “integrate” and “create” also had stronger correlations. Besides, “create” had a stronger correlation with the dimensions of “integrate”, “access” and “manage” (with the correlation coefficient for all these pairs>0.5). The correlation coefficient between “manage” and “integrate” was 0.41. This implied that these four dimensions, namely “access”, “manage”, “integrate” and “create” were closely correlated. Q1.1 and Q4 assessed students’ competence in these 4 IL dimensions, in which students were requested to obtain information by using the Internet and they needed to organize and categorize the information and select those useful for completing the task. Students were also demanded to make use of their competence in “create” to present the information. Students’ competences in these 4 IL dimensions would be applied to organizing information details and hence had a closer correlation among themselves than the other dimensions. Furthermore, we could see that students developed their competence in these dimensions at nearly the same time. Once the student mastered the competence in one dimension, he/she would also be able to master the competence in the other 3 dimensions.

The correlation between “define” and the other dimensions was comparatively weaker and the correlation coefficients for all of them were less than 0.3. Students had the highest score in “define” and most of the students could master the competence. It could be inferred that among the 7 IL dimensions, students acquired competence in the dimension of “define” initially and therefore found it easier to master. Smaller correlation coefficients were obtained between “define” and the other dimensions probably because many students still had not mastered the other 6 IL competences and thus had far worse performances than the competence of “define”, resulting in the smaller correlation coefficients.

*Table 9.32 Correlations of students' performance in IL of Chinese Language PA at primary schools*

| **Chinese Language IL Indicators** | **Define** | **Access** | **Manage** | **Integrate** | **Create** | **Communicate** | **Evaluate** | **Total** |
|---|---|---|---|---|---|---|---|---|
| **Define** | 1 | | | | | | | |
| **Access** | 0.22(**) | 1 | | | | | | |
| **Manage** | 0.21(**) | 0.54(**) | 1 | | | | | |
| **Integrate** | 0.26(**) | 0.54(**) | 0.41(**) | 1 | | | | |
| **Create** | 0.15(**) | 0.52(**) | 0.50(**) | 0.63(**) | 1 | | | |
| **Communicate** | 0.25(**) | 0.34(**) | 0.31(**) | 0.29(**) | 0.23(**) | 1 | | |
| **Evaluate** | 0.17(**) | 0.36(**) | 0.26(**) | 0.36(**) | 0.26(**) | 0.29(**) | 1 | |
| **Total** | 0.38(**) | 0.84(**) | 0.70(**) | 0.76(**) | 0.73(**) | 0.54(**) | 0.60(**) | 1 |

(N=825)

N.B. - The statistical test employed is Pearson product moment correlation analysis.
- ** Correlation is significant at the 0.01 level (2-tailed).

### 9.5.2 Correlation Analysis of the 8 Information Literacy Indicators in Primary Mathematics

Results in Table 9.33 indicated that the "total" score was strongly correlated with most of the IL dimensions (with the correlation coefficient >0.05) except "define" and "evaluate". Table 9.33 also indicated that all the 8 IL indicators were significantly correlated except the pair of "define" and "evaluate" (r=0.03). However, in general the correlation coefficients among the 7 IL dimensions were weak. Relatively higher correlation was observed between "access" and "integrate" (r=0.66) and "manage" and "communicate" (r=0.57).

*Table 9.33 Correlations of students' performance in IL of Mathematics PA at primary schools*

| **Mathematics IL Indicators** | **Define** | **Access** | **Manage** | **Integrate** | **Create** | **Communicate** | **Evaluate** | **Total** |
|---|---|---|---|---|---|---|---|---|
| **Define** | 1 | | | | | | | |
| **Access** | 0.36(**) | 1 | | | | | | |
| **Manage** | 0.12(**) | 0.25(**) | 1 | | | | | |
| **Integrate** | 0.27(**) | 0.66(**) | 0.40(**) | 1 | | | | |
| **Create** | 0.21(**) | 0.28(**) | 0.38(**) | 0.39(**) | 1 | | | |
| **Communicate** | 0.08(*) | 0.25(**) | 0.57(**) | 0.30(**) | 0.23(**) | 1 | | |
| **Evaluate** | 0.03 | 0.21(**) | 0.22(**) | 0.24(**) | 0.09(*) | 0.30(**) | 1 | |
| **Total** | 0.42(**) | 0.71(**) | 0.70(**) | 0.78(**) | 0.71(**) | 0.55(**) | 0.33(**) | 1 |

N=844

N.B. - The statistical test employed is Pearson product moment correlation analysis
- * Correlation is significant at the 0.05 level (2-tailed).
- ** Correlation is significant at the 0.01 level (2-tailed).

### 9.5.3 Correlation Analysis of the 8 Information Literacy Indicators in Primary Chinese Language and Primary Mathematics

Results of the correlation analysis of the 8 IL indicators between primary Mathematics and primary Chinese Language PAs showed weak correlation between these indicators. (Table 9.34) For the indicators of "access", "manage", "integrate", "create" and the "total" score in primary Mathematics, they were significantly correlated with all dimensions in Chinese Language. For indicators of "define" and "communicate" in primary Mathematics, they were significantly correlated with most of the IL dimensions in primary Chinese Language. Only three indicators in primary Chinese Language, namely "integrate", "create" and the "total" score were significantly correlated with the "evaluate" dimension in primary Mathematics. Regarding the correlations of the 8 corresponding pairs of IL indicators of Mathematics and Chinese Language PAs, all indicators were significantly correlated except the pair of "evaluate" (r=0.09) and the strongest correlation pair was "total" score with r=0.56.

*Table 9.34 Correlations of students' performance in IL of Mathematics and Chinese Language PAs at primary schools*

| Mathematics IL Indicators / Chinese Language IL Indicators | Define | Access | Manage | Integrate | Create | Communicate | Evaluate | Total |
|---|---|---|---|---|---|---|---|---|
| **Define** | 0.25(**) | 0.28(**) | 0.13(**) | 0.31(**) | 0.22(**) | 0.05 | 0.05 | 0.32(**) |
| **Access** | 0.21(**) | 0.32(**) | 0.28(**) | 0.34(**) | 0.27(**) | 0.20(**) | 0.08 | 0.41(**) |
| **Manage** | 0.22(**) | 0.33(**) | 0.18(**) | 0.37(**) | 0.15(**) | 0.16(**) | 0.06 | 0.34(**) |
| **Integrate** | 0.08 | 0.34(**) | 0.40(**) | 0.38(**) | 0.28(**) | 0.43(**) | 0.14(**) | 0.48(**) |
| **Create** | 0.09 | 0.30(**) | 0.30(**) | 0.31(**) | 0.21(**) | 0.28(**) | 0.12(*) | 0.38(**) |
| **Communicate** | 0.17(**) | 0.27(**) | 0.13(**) | 0.33(**) | 0.14(**) | 0.19(**) | 0.07 | 0.29(**) |
| **Evaluate** | 0.16(**) | 0.33(**) | 0.26(**) | 0.34(**) | 0.18(**) | 0.24(**) | 0.09 | 0.37(**) |
| **Total** | 0.24(**) | 0.48(**) | 0.38(**) | 0.49(**) | 0.32(**) | 0.34(**) | 0.13(**) | 0.56(**) |

N=412

N.B. - The statistical test employed is Pearson product moment correlation analysis
- * Correlation is significant at the 0.05 level (2-tailed).
- ** Correlation is significant at the 0.01 level (2-tailed).

### 9.5.4 Correlation Analysis of the 8 Information Literacy Indicators in Chinese Language of Secondary Schools

Individual IL indicator had different levels of correlation with each other in secondary Chinese Language PA and the correlations were statistically significant ($p<0.01$). The "total" score was strongly and positively correlated with the 7 IL dimensions. Except "define", the correlation coefficients of other dimensions with the "total" score were greater than 0.6. Among the 7 IL dimensions, "create" had a stronger correlation with "manage" and "integrate" and the correlation coefficient was greater than 0.5. "Create" and "integrate" had a stronger correlation probably due to the design of the question. Q5 was about the preparation of a PowerPoint file suitable for primary 3 students. In order to make the PowerPoint file attractive, students needed to make use of various special effects, e.g. photos, colours, fonts that demonstrated students' competence in the "create" dimension. Moreover, students were required to demonstrate their competence in the "integrate" dimension by organizing and selecting information instead of direct cutting and pasting the existing information obtained from the web, or else the font size would be too small or the content would be uninteresting to read. Since students were required to demonstrate both their competences in "create" and "integrate" dimensions during the preparation of the PowerPoint file, the correlation between these 2 dimensions was thus stronger.

The reason for the stronger correlation between "create" and "manage" might be due to the fact that students were requested to make use of charts, page breaks and headings to present their information. For example, Q1 requested students to demonstrate their competence in the "create" dimension to create a table, and then their competence in the "manage" dimension to match the literature works with their corresponding dynasties. Since the organization of information and the subsequent use of the information to create charts for presentation involved "create" and "manage" skills, therefore, the correlation between the two dimensions was stronger.

*Table 9.35 Correlations of students' performance in IL of Chinese Language PA at secondary schools*

| Chinese Language IL Indicators | Define | Access | Manage | Integrate | Create | Communicate | Evaluate | Total |
|---|---|---|---|---|---|---|---|---|
| **Define** | 1 | | | | | | | |
| **Access** | 0.20(**) | 1 | | | | | | |
| **Manage** | 0.12(**) | 0.50(**) | 1 | | | | | |
| **Integrate** | 0.14(**) | 0.31(**) | 0.44(**) | 1 | | | | |
| **Create** | 0.12(**) | 0.35(**) | 0.54(**) | 0.58(**) | 1 | | | |
| **Communicate** | 0.16(**) | 0.40(**) | 0.34(**) | 0.47(**) | 0.33(**) | 1 | | |
| **Evaluate** | 0.25(**) | 0.50(**) | 0.33(**) | 0.31(**) | 0.26(**) | 0.31(**) | 1 | |
| **Total** | 0.30(**) | 0.78(**) | 0.77(**) | 0.72(**) | 0.68(**) | 0.63(**) | 0.63(**) | 1 |

(N=820)

N.B.- The statistical test employed is Pearson product moment correlation analysis
- ** Correlation is significant at the 0.01 level (2-tailed).

### 9.5.5 Correlation Analysis of the 8 Information Literacy Indicators in Science of Secondary Schools

When examining correlations between 8 IL indicators in Science PA, results from the Pearson Correlation analysis in Table 9.36 showed that the total score of Science was positively correlated with the seven dimensions of IL and all the results were statistically significant. Within the 7 IL dimensions, 12 pairs were significantly correlated and 11 out of 12 pairs were positively correlated with each other. Among the 7 IL dimensions, the two highly correlated pairs were "manage" and "communicate" (r=.52), as well as "integrate" and "evaluate"(r=.49). For "define" and "create", the correlation found was slightly negative but significant.

*Table 9.36 Correlations of students' performance in IL of Science PA at secondary schools*

| Science IL Indicators | Define | Access | Manage | Integrate | Create | Communicate | Evaluate | Total |
|---|---|---|---|---|---|---|---|---|
| **Define** | 1 | | | | | | | |
| **Access** | 0.43(**) | 1 | | | | | | |
| **Manage** | 0.24(**) | 0.35(**) | 1 | | | | | |
| **Integrate** | 0.03 | 0.04 | 0.14(**) | 1 | | | | |
| **Create** | -0.09(*) | -0.03 | -0.03 | 0.28(**) | 1 | | | |
| **Communicate** | 0.19(**) | 0.10(**) | 0.52(**) | 0.07 (*) | -0.03 | 1 | | |
| **Evaluate** | 0.04 | 0.04 | 0.06 | 0.49(**) | 0.23(**) | -0.02 | 1 | |
| **Total** | 0.55(**) | 0.59(**) | 0.60(**) | 0.66(**) | 0.26(**) | 0.38 (**) | 0.47 (**) | 1 |

N=845

N.B. - The statistical test employed is Pearson product moment correlation analysis
- * Correlation is significant at the 0.05 level (2-tailed).
- ** Correlation is significant at the 0.01 level (2-tailed).

### 9.5.6 Correlation Analysis of 8 Information Literacy Indicators in Science and Chinese Language of Secondary Schools

Table 9.37 below presents students' performance for 8 IL indicators in Science and Chinese Language at the secondary schools. In general, the correlation between Science and Chinese Language was weak. When examining correlations among the one to one corresponding pairs of the 8 IL indicators of Science and Chinese Language, only four pairs were positive and statistically significant. They were "access "(r=.12), "manage" (r=.13), "integrate" (r=.29) and the "total" score (r=.24). One pair, "communicate" was negatively and significant correlated (r=-.16).

*Table 9.37 Correlations of students' performance in IL of Science and Chinese Language PAs at secondary schools*

| Chinese Language IL Indicators \ Science IL Indicators | Define | Access | Manage | Integrate | Create | Communicate | Evaluate | Total |
|---|---|---|---|---|---|---|---|---|
| **Define** | 0.03 | 0.06 | 0.02 | 0.06 | -0.09 | -0.03 | 0.10(*) | 0.06 |
| **Access** | 0.16(**) | 0.12(*) | 0.12(*) | 0.07 | 0.06 | -.258(**) | -0.03 | 0.13(**) |
| **Manage** | 0.13(**) | 0.11(*) | 0.13(**) | 0.20(**) | 0.16(**) | -.14(**) | 0.03 | 0.22(**) |
| **Integrate** | 0.05 | 0.06 | 0.17(**) | 0.29(**) | 0.09 | 0.03 | 0.06 | 0.25(**) |
| **Create** | 0.06 | 0.08 | 0.13(**) | 0.16(**) | 0.03 | -0.03 | 0.02 | 0.17(**) |
| **Communicate** | 0.07 | 0.07 | 0.09 | 0.15(**) | 0.09 | -0.16(**) | -0.04 | 0.13(*) |
| **Evaluate** | 0.07 | 0.09 | 0.15(**) | 0.14(**) | 0.10(*) | -0.182(**) | 0.03 | 0.15(**) |
| **Total** | 0.14(**) | 0.13(**) | 0.18(**) | 0.23(**) | 0.12(*) | -0.179(**) | 0.02 | 0.24(**) |

N=412

N.B. - The statistical test employed is Pearson product moment correlation analysis
- * Correlation is significant at the 0.05 level (2-tailed).
- ** Correlation is significant at the 0.01 level (2-tailed).

## 9.6 Further Analyses of 8 Information Literacy Indicators in Specific Key Learning Areas and Technical Performance Assessment

### 9.6.1 Correlation Analysis of 8 Information Literacy Indicators in Technical Performance Assessment

#### *9.6.1.1 Primary Schools*

When examining correlations across the 8 IL indicators for the primary school students in Technical PA, results from the Pearson Correlation analysis in Table 9.38 showed that the “total” score of the PA was positively correlated with the seven dimensions and all the results were statistically significant. Besides, pairs amongst all indicators were significantly correlated and all pairs were positively correlated with each other. Relatively higher correlations were observed between “integrate” and “evaluate” (r=.64), “access” and “evaluate” (r=.55), as well as “manage” and “integrate” (r=.50). There were three pairs of indicators which were weakly correlated but the results were statistically significant. They were “define” and “communicate” (r=.05), “access” and “communicate” (r=.07), as well as “create” and “communicate” (r=.08).

*Table 9.38 Correlations of students' performance in IL of Technical PA at primary schools*

| Technical IL Indicators | Define | Access | Manage | Integrate | Create | Communicate | Evaluate | Total |
|---|---|---|---|---|---|---|---|---|
| **Define** | 1 | | | | | | | |
| **Access** | 0.32(**) | 1 | | | | | | |
| **Manage** | 0.27(**) | 0.32(**) | 1 | | | | | |
| **Integrate** | 0.16(**) | 0.20(**) | 0.50(**) | 1 | | | | |
| **Create** | 0.10(**) | 0.11(**) | 0.28(**) | 0.41(**) | 1 | | | |
| **Communicate** | 0.05(**) | 0.07(**) | 0.11(**) | 0.26(**) | 0.08(**) | 1 | | |
| **Evaluate** | 0.26(**) | 0.55(**) | 0.49(**) | 0.64(**) | 0.30(**) | 0.14(**) | 1 | |
| **Total** | 0.51(**) | 0.73(**) | 0.74(**) | 0.67(**) | 0.39(**) | 0.22(**) | 0.84(**) | 1 |

N=830

N.B. - The statistical test employed is Pearson product moment correlation analysis
- ** Correlation is significant at the 0.01 level (2-tailed).

#### *9.6.1.2 Secondary Schools*

When examining correlations across the 8 IL indicators for the secondary school students' performance in Technical PA, results from the Pearson Correlation analysis in Table 9.39 showed that the "total" score of the PA was positively correlated with the seven dimensions and all the results were statistically significant. Pairs amongst all indicators were significantly correlated, except for the pair of "access" and "communicate". Relatively higher correlations were observed between "integrate" and "evaluate" (r=.68) as well as "manage" and "integrate" (r=.52). On the other hand, there were two pairs of indicators which were weakly correlated. They were "define" and "communicate" (r=.03) as well as "create" and "communicate" (r=.04).

*Table 9.39 Correlations of students' performance in IL of Technical PA at secondary schools*

| Technical IL Indicators | Define | Access | Manage | Integrate | Create | Communicate | Evaluate | Total |
|---|---|---|---|---|---|---|---|---|
| **Define** | 1 | | | | | | | |
| **Access** | 0.40(**) | 1 | | | | | | |
| **Manage** | 0.23(**) | 0.26(**) | 1 | | | | | |
| **Integrate** | 0.18(**) | 0.17(**) | 0.52(**) | 1 | | | | |
| **Create** | 0.09(**) | 0.13(**) | 0.32(**) | 0.33(**) | 1 | | | |
| **Communicate** | 0.03(**) | -0.00 | 0.11(**) | 0.25(**) | 0.04(**) | 1 | | |
| **Evaluate** | 0.33(**) | 0.49(**) | 0.46(**) | 0.68(**) | 0.26(**) | 0.10(**) | 1 | |
| **Total** | 0.51(**) | 0.62(**) | 0.72(**) | 0.75(**) | 0.42(**) | 0.21(**) | 0.86(**) | 1 |

N=845

N.B. - The statistical test employed is Pearson product moment correlation analysis
- ** Correlation is significant at the 0.01 level (2-tailed).

### 9.6.2 Further Analyses of 8 Information Literacy Indicators in Technical and Chinese Language Performance Assessments

#### *9.6.2.1 Primary Chinese Language*

Pearson Correlation analyses were conducted to investigate the correlation among the IL indicators of Chinese Language and Technical competences. The “total” score of the Chinese Language PA and the Technical PA had stronger correlation with the correlation coefficient of 0.56. This suggested that if students had better performance in the Technical PA, they would also perform better in the Chinese Language PA. This was because students’ good performance in Technical PA reflected their familiarity with using computer. Hence, they would perform better if their performance in Chinese Language was assessed using IT. To the contrary, if students were not familiar with the use of computer, they would encounter more difficulties in completing the Chinese Language PA and might need to spend more time to figure out how the online assessment worked, resulting in not having enough time to complete all the questions. Therefore, the Technical and the Chinese Language PA had a stronger correlation in terms of the “total” score.

Regarding the correlations of the 8 corresponding pairs of IL indicators in Chinese Language and Technical PAs, results showed that except the pair “communicate”, the other 7 pairs were statistically correlated ($p<0.01$). The correlation between the “communicate” dimension of the two subjects was not significant probably because students were asked to write an email in the Chinese Language PA with much emphasis on the format or proper register of the email. However, Technical PA requested students to express and discussed their views in the online discussion forum with other students. In addition, many students were unable to complete this question in the Technical PA, resulting in the insignificant correlation between the “communicate” dimension of the two subjects.

Although the correlation of the corresponding pairs of other IL dimensions reached the statistically significant level, the correlation coefficients were small. Stronger correlations were found between the “manage” and “integrate” dimensions of the two subjects with the correlation coefficients of 0.41 and 0.40 respectively, probably because the questions for the two PAs were quite similar. The questions related to “manage” and “integrate” in the Chinese Language PA and Technical PA had many similarities. For example, for “manage”, questions in both PAs requested students to save the file in a proper location. Similarly, questions for “integrate” in both PAs requested students to integrate information so as to prepare a PowerPoint file. Therefore, the correlations of the two dimensions between the two subjects were stronger.

*Table 9.40 Correlations of students' performance in IL of Chinese Language and Technical PAs at primary level*

| Technical IL Indicators \ Chinese Language IL Indicators | **Define** | **Access** | **Manage** | **Integrate** | **Create** | **Communicate** | **Evaluate** | **Total** |
|---|---|---|---|---|---|---|---|---|
| **Define** | 0.32(**) | 0.25(**) | 0.31(**) | 0.25(**) | 0.19(**) | 0.27(**) | 0.18(**) | 0.35(**) |
| **Access** | 0.21(**) | 0.15(**) | 0.18(**) | 0.18(**) | 0.14(**) | 0.19(**) | 0.21(**) | 0.25(**) |
| **Manage** | 0.32(**) | 0.41(**) | 0.41(**) | 0.54(**) | 0.38(**) | 0.36(**) | 0.31(**) | 0.57(**) |
| **Integrate** | 0.22(**) | 0.35(**) | 0.24(**) | 0.40(**) | 0.30(**) | 0.16(**) | 0.16(**) | 0.40(**) |
| **Create** | 0.16(**) | 0.23(**) | 0.20(**) | 0.21(**) | 0.31(**) | 0.16(**) | 0.08 | 0.29(**) |
| **Communicate** | 0.05 | 0.00 | -0.05 | 0.06 | 0.02 | 0.07 | 0.04 | 0.04 |
| **Evaluate** | 0.33(**) | 0.33(**) | 0.29(**) | 0.38(**) | 0.30(**) | 0.30(**) | 0.28(**) | 0.45(**) |
| **Total** | 0.39(**) | 0.41(**) | 0.39(**) | 0.48(**) | 0.37(**) | 0.36(**) | 0.32(**) | 0.56(**) |

N=399

N.B. - The statistical test employed is Pearson product moment correlation analysis
- ** Correlation is significant at the 0.01 level (2-tailed)

A two-way ANOVA indicated the interaction effect of any two technical competences on the 7 IL dimensions in Chinese Language. Table 9.41 illustrated that there was broader interaction effect between "define" and "communicate" than other Technical competences on Chinese Language competences in primary schools. Among the 7 IL dimensions of the Chinese Language, "assess", "integrate", "communicate", "create" and "evaluate" were influenced by the interaction effect of "define" and "communicate" of Technical PA. Detailed statistical results can be found in Appendix 9.1.

*Table 9.41 Interaction effect of any two technical competences on each Chinese Language IL competence for primary school students*

| Technical IL Indicators | Technical (Define) | Technical (Access) | Technical (Manage) | Technical (Integrate) | Technical (Create) | Technical (Communicate) | Technical (Evaluate) |
|---|---|---|---|---|---|---|---|
| **Technical (Define)** | | | | | | | |
| **Technical (Access)** | Chinese Language (define)*<br>Chinese Language (evaluate)* | | | | | | |
| **Technical (Manage)** | | Chinese Language (communicate) ** | | | | | |
| **Technical (Integrate)** | | | Chinese Language (create)* | | | | |
| **Technical (Create)** | | | | | | | |
| **Technical (Communicate)** | Chinese Language (access)*<br>Chinese Language (integrate)**<br>Chinese Language (communicate)**<br>Chinese Language (create)*<br>Chinese Language (evaluate)* | | | | | | |
| **Technical (Evaluate)** | | | | | Chinese Language (create)* | | |

N=399

NB - The statistical test employed is two-way ANOVA
- *Statically significant at $p<0.05$
- ** Statically significant at $p<0.01$

### *9.6.2.2 Secondary Chinese Language*

For the secondary schools, the "total" score of the Chinese Language PA and the Technical PA had stronger correlation with the correlation coefficient of 0.49. This implied that if students had better performance in the Technical PA, they would also have better performance in the Chinese Language PA. The reason was similar to that of the primary schools. Regarding the correlations of the 8 corresponding pairs of IL indicators in Chinese Language and Technical PAs, it was found that all the 8 corresponding IL indicators between the two subjects were significantly but weakly correlated. Stronger correlations were found between the "manage" and "integrate" dimensions of the two subjects with the correlation coefficients of 0.39 and 0.33 respectively. The reason was similar to that of the primary schools. Questions related to the dimensions of "manage" and "integrate" were similar in the Chinese Language PA and Technical PA. For example, for "manage", student needed to save the file in a proper location in both PAs; for "integrate", students in both PAs were requested to integrate the information to prepare a PowerPoint file. Therefore, the correlations of these two competences between the two subjects were stronger.

*Table 9.42 Correlations of students' performance in IL of Chinese Language and Technical PAs at secondary level*

| Technical IL Indicators \ Chinese Language IL Indicators | **Define** | **Access** | **Manage** | **Integrate** | **Create** | **Communicate** | **Evaluate** | **Total** |
|---|---|---|---|---|---|---|---|---|
| **Define** | 0.11(*) | 0.12(*) | 0.18(**) | 0.13(*) | 0.11(*) | 0.19(**) | 0.20(**) | 0.22(**) |
| **Access** | 0.14(**) | 0.21(**) | 0.20(**) | 0.16(**) | 0.11(*) | 0.15(**) | 0.16(**) | 0.25(**) |
| **Manage** | 0.10 | 0.32(**) | 0.33(**) | 0.31(**) | 0.35(**) | 0.18(**) | 0.20(**) | 0.41(**) |
| **Integrate** | -0.02 | 0.20(**) | 0.25(**) | 0.39(**) | 0.27(**) | 0.29(**) | 0.19(**) | 0.37(**) |
| **Create** | -0.04 | 0.17(**) | 0.22(**) | 0.22(**) | 0.30(**) | 0.21(**) | 0.16(**) | 0.29(**) |
| **Communicate** | -0.00 | -0.01 | 0.08 | 0.22(**) | 0.12(*) | 0.18(**) | 0.11(*) | 0.15(**) |
| **Evaluate** | 0.06 | 0.23(**) | 0.27(**) | 0.34(**) | 0.19(**) | 0.35(**) | 0.18(**) | 0.37(**) |
| **Total** | 0.09 | 0.32(**) | 0.37(**) | 0.41(**) | 0.33(**) | 0.36(**) | 0.27(**) | 0.49(**) |

N=412

N.B. - The statistical test employed is Pearson product-moment correlation analysis.
-* Correlation is significant at the 0.05 level (2-tailed).
- ** Correlation is significant at the 0.01 level (2-tailed).

A two-way ANOVA indicated the interaction effect of any two technical competences on the 7 IL dimensions in Chinese Language. Table 9.43 showed that the interaction effect of "access" and "integrate" in Technical PA significantly affected the "define" dimension of Chinese Language. The interaction effect of "create and "define" in Technical PA significantly affected the "integrate" dimension of Chinese Language. The interaction effect of "create" and "manage" in Technical PA significantly affected the "define" dimension of Chinese Language. For the interaction effect of other dimensions of Technical PA, there was no interaction effect on individual IL dimensions of the Chinese Language. Detailed statistical results can be found in Appendix 9.2.

*Table 9.43 Interaction effect of any two technical competences on each Chinese Language IL competence for secondary school students*

| Technical IL Indicators | Define | Access | Manage | Integrate | Create | Communicate | Evaluate |
|---|---|---|---|---|---|---|---|
| **Define** | | | | | Chinese Language (integrate)* | | |
| **Access** | | | | Chinese Language (define)* | | | |
| **Manage** | | | | | Chinese Language (define)* | | |
| **Integrate** | | | | | | | |
| **Create** | | | | | | | |
| **Communicate** | | | | | | | |
| **Evaluate** | | | | | | | |

N=412

N.B. - The statistical test employed is two-way ANOVA
- *Correlation is significant at the 0.05 level

### 9.6.3 Further Analyses of 8 Information Literacy Indicators in Technical and Mathematics Performance Assessments

Regarding the one to one corresponding pairs of the 8 IL indicators, Table 9.44 showed that all the 8 pairs were positively and weakly correlated. When comparing correlation coefficients of the 8 IL indicators, the coefficient of the "total" score was relatively higher. It was also found that except the pair of "create", the other 7 pairs of indicators were statistically correlated.

A two-way ANOVA test in Table 9.45 indicated the interaction effect of any two technical competences on the 7 IL dimensions in Mathematics. There were 9 pairs of indicators that had interaction effect on Mathematics IL competence. Besides it was revealed that among the 7 dimensions in Mathematics, "communicate" and "evaluate" were affected most by such interaction (Table 9.46). Detailed statistical results can be found in Appendix 9.3.

*Table 9.44 Correlations of students' performance in IL of Mathematics and Technical PAs at primary schools*

| **Technical IL Indicators** \ **Mathematics IL Indicators** | **Define** | **Access** | **Manage** | **Integrate** | **Create** | **Communicate** | **Evaluate** | **Total** |
|---|---|---|---|---|---|---|---|---|
| **Define** | 0.28(**) | 0.26(**) | 0.13(**) | 0.18(**) | 0.15(**) | 0.10(*) | 0.05 | 0.26(**) |
| **Access** | 0.17(**) | 0.20(**) | 0.16(**) | 0.21(**) | 0.15(**) | 0.20(**) | 0.05 | 0.26(**) |
| **Manage** | 0.14(**) | 0.36(**) | 0.34(**) | 0.37(**) | 0.30(**) | 0.33(**) | 0.16(**) | 0.48(**) |
| **Integrate** | 0.06 | 0.18(**) | 0.29(**) | 0.25(**) | 0.20(**) | 0.30(**) | 0.11(*) | 0.33(**) |
| **Create** | 0.05 | 0.14(**) | 0.10(*) | 0.15(**) | 0.03 | 0.11(*) | 0.04 | 0.15(**) |
| **Communicate** | 0.04 | 0.03 | 0.14(**) | 0.06 | -0.03 | 0.22(**) | 0.04 | 0.09 |
| **Evaluate** | 0.18(**) | 0.25(**) | 0.23(**) | 0.23(**) | 0.21(**) | 0.27(**) | 0.11(*) | 0.34(**) |
| **Total** | 0.24(**) | 0.36(**) | 0.33(**) | 0.36(**) | 0.28(**) | 0.35(**) | 0.14(**) | 0.48(**) |

N=407

N.B. - The statistical test employed is Pearson product-moment correlation analysis.
- * Correlation is significant at the 0.05 level (2-tailed).
- ** Correlation is significant at the 0.01 level (2-tailed).

*Table 9.45 Interaction effect of any two technical competences on each Mathematics IL competence for primary school students*

| **Technical IL Indicators** | **Technical (Define)** | **Technical (Access)** | **Technical (Manage)** | **Technical (Integrate)** | **Technical (Create)** | **Technical (Communicate)** | **Technical (Evaluate)** |
|---|---|---|---|---|---|---|---|
| **Technical (Define)** | | | | | | | |
| **Technical (Access)** | | | | | | | |
| **Technical (Manage)** | | | | | | | |
| **Technical (Integrate)** | Mathematics (evaluate) | Mathematics (communicate) | Mathematics (access)<br>Mathematics (communicate) | | | | |
| **Technical (Create)** | | Mathematics (communicate) | Mathematics (communicate)<br>Mathematics (evaluate) | Mathematics (manage) | | | |
| **Technical (Communicate)** | | | Mathematics (access) | | | | |
| **Technical (Evaluate)** | | | Mathematics (communicate) | | Mathematics (communicate)<br>Mathematics (evaluate) | | |

N=407

N.B. - The statistical test employed is two-way ANOVA.

*Table 9.46 Significance level of the interaction effect of any two technical proficiency on each Mathematics IL competence for primary school students*

| Interactions | Mathematics. (Access) | Mathematics. (Manage) | Mathematics. (Create) | Mathematics. (Communicate) | Mathematics. (Evaluate) |
|---|---|---|---|---|---|
| **Technical (Define)*Technical (Integrate)** | | | | | 0.04 |
| **Technical (Access)*Technical (Integrate)** | | | | 0.05 | |
| **Technical (Access)*Technical (Create)** | | | | 0.01 | |
| **Technical (Manage)*Technical (Integrate)** | 0.04 | | | 0.02 | |
| **Technical (Manage)*Technical (Create)** | | | | 0.05 | 0.03 |
| **Technical (Manage)*Technical (Communicate)** | 0.04 | | | | |
| **Technical (Manage)*Technical (Evaluate)** | | | | 0.01 | |
| **Technical (Integrate)*Technical (Create)** | | 0.05 | | | |
| **Technical (Create)*Technical (Evaluate)** | | | | 0.02 | 0.02 |

### 9.6.4 Further Analyses of 8 Information Literacy Indicators in Technical and Science Performance Assessments

Correlations of the technical competences and Science IL competences were shown in Table 9.47 below. In general, all the significantly correlated pairs were weakly correlated. Regarding correlations among the one to one corresponding pairs of the 8 IL indicators of Science and Technical PAs, five pairs were found statistically significant. They were “define” (r=.11), “manage” (r=.20), “integrate” (r=.33), “evaluate” (r=.11) and the “total” score (r=.41).

*Table 9.47 Correlations of students’ performance in IL of Science and Technical PAs at secondary schools*

| Science IL Indicators / Technical IL Indicators | Science (Define) | Science (Access) | Science (Manage) | Science (Integrate) | Science (Create) | Science (Communicate) | Science (Evaluate) | Science (Total) |
|---|---|---|---|---|---|---|---|---|
| **Technical (Define)** | 0.11(*) | 0.10 | 0.14(**) | 0.19(**) | 0.05 | 0.04 | 0.08 | 0.22(**) |
| **Technical (Access)** | 0.06 | 0.06 | 0.20(**) | 0.16(**) | 0.15(**) | 0.03 | 0.10(*) | 0.21(**) |
| **Technical (Manage)** | 0.12(*) | 0.15(**) | 0.20(**) | 0.30(**) | 0.19(**) | 0.21(**) | 0.19(**) | 0.36(**) |
| **Technical (Integrate)** | 0.13(**) | 0.25(**) | 0.14 (**) | 0.33 (**) | 0.12(*) | 0.09 | 0.20(**) | 0.37(**) |
| **Technical (Create)** | 0.01 | -0.01 | 0.13(**) | 0.09 | 0.05 | 0.03 | 0.09 | 0.10(*) |
| **Technical (Communicate)** | 0.01 | -0.02 | -0.02 | 0.10(*) | 0.01 | 0.07 | 0.12(*) | 0.07 |
| **Technical (Evaluate)** | 0.05 | 0.20(**) | 0.21(**) | 0.23(**) | 0.12(*) | 0.05 | 0.11(*) | 0.28(**) |
| **Technical (Total)** | 0.12 (*) | 0.21(**) | 0.25(**) | 0.34 (**) | 0.18(**) | 0.13(**) | 0.20(**) | 0.41(**) |

N=417

N.B. - The statistical test employed is Pearson product-moment correlation analysis.
-* Correlation is significant at the 0.05 level (2-tailed).
- ** Correlation is significant at the 0.01 level (2-tailed).

When comparing Table 9.47 and Table 9.37, it was found that correlations between the indicators of Science and Technical PAs were slightly stronger than correlations between most of the indicators of Science and Chinese Language PAs. Among the 7 corresponding dimensions, the highest Pearson correlation coefficient was found in the “integrate” dimension for Science PA and Chinese Language PA, as well as Science PA and Technical PA.

A further analysis (two-way ANOVA) was performed to examine whether there were any interaction effects between two indicators of Technical competences on Science IL competences. Table 9.48 presented the pairs with interaction effect on the 7 dimensions of IL in Science. For detailed statistical results, please refer to Appendix 9.4. For Table 9.48, it was illustrated that the interaction effect of “integrate” and “communicate” in Technical PA had broader impact on Science IL competences as significant interaction effect was observed in 5 out of 7 dimensions.

*Table 9.48 Interaction effect of any two technical competences on each Science IL competences for secondary school students*

| **Technical IL Indicators** | **Technical (Define)** | **Technical (Access)** | **Technical (Manage)** | **Technical (Integrate)** | **Technical (Create)** | **Technical (Communicate)** | **Technical (Evaluate)** |
|---|---|---|---|---|---|---|---|
| **Technical (Define)** | | | | | | | |
| **Technical (Access)** | | | | | | | |
| **Technical (Manage)** | Science (evaluate )<br>Science (total) | | | | | | |
| **Technical (Integrate)** | Science (evaluate) | | Science (communicate) | | | | |
| **Technical (Create)** | Science (access) | | | Science (manage) | | | |
| **Technical (Communicate)** | Science (manage) | | | Science (access)<br>Science (manage)<br>Science (integrate)<br>Science (communicate)<br>Science (create) | | | |
| **Technical (Evaluate)** | Science (manage)<br>Science (create) | Science (define) | Science (manage) | | | Science (communicate) | |

N=417

N.B. - The statistical test employed is two-way ANOVA.

## 9.7 Examining the Effect of Gender, Experience in Computer Use and Other Background Factors on Students' Technical Proficiency and Information Literacy Competences

In this section, some background factors of students will be explored in order to find out whether there were any effects on the students' performance in assessments. As small amount of special school data were collected, special school students' data were excluded in the following sections.

### 9.7.1 Gender

Many earlier researches found gender differences in the acquisition of computer knowledge and skills (Shashaani, 1994 and Young, B. 2000). In order to explore whether such gender differences exist in each PA, an ANOVA was conducted for each PA.

#### *9.7.1.1 Science*

In Science PA, the male students' mean scores in "define", "integrate", "communicate" and "evaluate" dimensions as well as the "total" score were higher than those of the female students and the results were significant except in "define". For the dimensions of "access", "manage" and "create", the performance of the females was better than that of the males but significant differences were identified in the dimension of "communicate" only.

*Table 9.49 Mean scores of 8 IL indicators in Science PA at secondary schools with regard to gender*

| Science IL Indicators | Male | | Female | | F | Sig. |
|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | | |
| **Define** | 2.97 | (1.89) | 2.96 | (1.87) | 0.00 | 0.98 |
| **Access** | 2.24 | (1.86) | 2.34 | (1.97) | 0.55 | 0.46 |
| **Manage** | 1.71 | (1.65) | 1.82 | (1.70) | 0.87 | 0.35 |
| **Integrate** | 2.50 | (2.99) | 1.69 | (2.49) | 17.70 | 0.00* |
| **Create** | 0.40 | (0.66) | 0.49 | (0.77) | 3.56 | 0.06 |
| **Communicate** | 0.89 | (0.79) | 0.62 | (0.80) | 23.84 | 0.00* |
| **Evaluate** | 0.56 | (1.11) | 0.38 | (0.94) | 6.08 | 0.01* |
| **Total** | 11.27 | (6.08) | 10.30 | (5.80) | 5.40 | 0.02* |
| N | 432 | | 388 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig. (p)<0.05.

#### *9.7.1.2 Mathematics*

Among the 8 IL indicators, male students outperformed the female students except in the "communicate" dimension. ANOVA was conducted for Mathematics PA. No gender effect was discovered although the boys' overall performance was slightly better. In the dimension of "manage", the boys' mean score was relatively higher than that of the girls (3.46 - 3.21=0.25) (Table 9.50).

*Table 9.50 Mean scores of 8IL indicators in Mathematics PA at primary schools with regard to gender*

| Mathematics IL Indicators | Male | | Female | | F | Sig. |
|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | | |
| **Define** | 1.89 | (0.98) | 1.76 | (1.03) | 3.51 | 0.06 |
| **Access** | 4.33 | (2.21) | 4.12 | (2.11) | 2.02 | 0.16 |
| **Manage** | 3.46 | (2.23) | 3.21 | (2.31) | 2.48 | 0.12 |
| **Integrate** | 2.41 | (2.07) | 2.33 | (1.80) | 0.28 | 0.60 |
| **Create** | 4.22 | (2.87) | 4.21 | (2.94) | 0.00 | 0.96 |
| **Communicate** | 0.80 | (0.98) | 0.80 | (0.95) | 0.01 | 0.92 |
| **Evaluate** | 0.20 | (0.70) | 0.12 | (0.52) | 3.48 | 0.06 |
| **Total** | 17.32 | (8.16) | 16.56 | (7.35) | 1.90 | 0.17 |
| N | 432 | | 371 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig. (p)<0.05.

### *9.7.1.3 Technical*

For the primary school students, when examining the gender and the mean scores of the 8 IL indicators in Technical PA, it was found that the female students had higher mean scores than those of the male students in all indicators, except the dimension of "integrate". However, gender difference was statistically significant only in the dimensions of "define", "access", "manage", "evaluate" and the "total" score.

*Table 9.51 Mean scores of 8 IL indicators in Technical PA at primary schools with regard to gender*

| Technical IL Indicators | Male | | Female | | F | Sig. |
|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | | |
| **Define** | 1.00 | (1.20) | 1.28 | (1.26) | 10.09 | 0.00* |
| **Access** | 6.79 | (2.30) | 7.12 | (2.15) | 4.24 | 0.04* |
| **Manage** | 2.47 | (1.96) | 2.74 | (1.97) | 3.81 | 0.05* |
| **Integrate** | 0.65 | (1.07) | 0.61 | (1.10) | 0.25 | 0.61 |
| **Create** | 0.22 | (0.50) | 0.23 | (0.52) | 0.07 | 0.79 |
| **Communicate** | 0.09 | (0.32) | 0.10 | (0.38) | 0.35 | 0.55 |
| **Evaluate** | 2.94 | (1.95) | 3.25 | (1.95) | 5.06 | 0.02* |
| **Total** | 14.17 | (6.30) | 15.34 | (6.35) | 6.83 | 0.01* |
| N | 421 | | 380 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

For the secondary school students, when examining the gender and the mean scores of 8 IL indicators in Technical PA, it was found that female students had higher mean scores than male students in all indicators, except in the dimensions of “define” and “communicate”. It was also observed that for female students, the mean score of the “evaluate” dimension was much higher than that of male students. For the ANOVA, it was only in the dimensions of “create” and “evaluate” as well as the “total” score that the differences in the mean scores between male and female students were found statistically significant.

*Table 9.52 Mean scores of 8 IL indicators in Technical PA at secondary schools with regard to gender*

| Technical IL Indicators | Male | | Female | | F | Sig. |
|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | | |
| **Define** | 2.02 | (1.20) | 2.01 | (1.14) | 0.02 | 0.88 |
| **Access** | 7.89 | (1.64) | 7.97 | (1.47) | 0.46 | 0.50 |
| **Manage** | 4.69 | (1.97) | 4.73 | (1.98) | 0.10 | 0.75 |
| **Integrate** | 1.75 | (1.54) | 1.77 | (1.55) | 0.04 | 0.84 |
| **Create** | 0.46 | (0.71) | 0.58 | (0.81) | 5.35 | 0.02* |
| **Communicate** | 0.33 | (0.60) | 0.25 | (0.57) | 3.63 | 0.06 |
| **Evaluate** | 5.42 | (2.61) | 6.42 | (2.30) | 32.53 | 0.00* |
| **Total** | 22.55 | (6.79) | 23.74 | (6.42) | 6.26 | 0.01* |
| N | 460 | | 345 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

#### *9.7.1.4 Primary Chinese Language*

For the primary Chinese Language PA, the number of male students (53.2%) and female students (46.8%) was approximately equal. Female students had higher mean scores in all the 7 IL dimensions. However, the result of ANOVA showed that gender difference in mean scores were statistically significant only in the “communicate” and “create” dimensions with the former $F(1, 797) = 19.01$, $p<0.001$ and the latter $F(1, 797)=4.3$, $p<0.05$. This implied that there was a gender difference in the competences of “communicate” and “create” in Chinese Language, of which female students performed better than male students.

The standard deviation of the scores of male and female students in “communicate” was similar. The mean scores of female students were higher than that of the male students by 0.49 marks, probably because female students usually develop better language abilities than male students in primary schools. Since “communicate” focused on students’ language abilities, so female students performed better than male students. Besides, “communicate” in Chinese Language put much emphasis on the email format and register. Since female students were in general more meticulous than male students; therefore, female students scored higher in items like “addressing the recipient and sender" and "proper register".

For the "create" dimension, the standard deviation of the scores of male and female students was similar. The mean scores of female students were higher than that of the male students by 0.32 marks, probably because female students were more conscientious than male students. Female students tended to pay more attention to the aesthetic side of the PowerPoint files and thus they would use more special effects like fonts, background and images. Hence, they got a better score in the "create" dimension.

*Table 9.53 Mean scores of 8 IL indicators in Chinese Language PA at Primary schools with regard to gender*

| **Chinese Language IL Indicators** | **Male** | | **Female** | | **F** | **Sig.** |
|---|---|---|---|---|---|---|
| | **Mean** | **(SD)** | **Mean** | **(SD)** | | |
| **Define** | 1.40 | (0.98) | 1.44 | (0.92) | 0.33 | 0.57 |
| **Access** | 4.41 | (3.76) | 4.78 | (3.72) | 1.88 | 0.17 |
| **Manage** | 2.22 | (1.85) | 2.39 | (1.76) | 1.84 | 0.18 |
| **Integrate** | 2.61 | (2.08) | 2.80 | (2.05) | 1.78 | 0.18 |
| **Create** | 2.54 | (2.13) | 2.86 | (2.11) | 4.30 | 0.04* |
| **Communicate** | 2.25 | (1.50) | 2.74 | (1.67) | 19.01 | 0.00* |
| **Evaluate** | 2.09 | (2.26) | 2.18 | (2.32) | 0.30 | 0.59 |
| **Total** | 17.52 | (10.10) | 19.19 | (10.05) | 5.41 | 0.02* |
| N | 425 | | 374 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

#### *9.7.1.5 Secondary Chinese Language*

For the secondary Chinese Language PA, the number of male students (49.1%) and female students (50.9%) was approximately equal. Male students performed better in "define", "access" and "evaluate" while female students performed better in "manage", "integrate", "communicate" and "create" as well as the "total" score. This reflected that female students performed better in most of the dimensions. However, the result of the ANOVA showed that statistically significant differences were only found in the "create" dimension ($p<0.05$).

The performance of male students and female students were similar in the "create" dimension and the mean scores of female students were higher than that of the male students by 0.3 marks. The reason was similar to that of primary schools. Female students in general were more conscientious than male students. They tended to pay more attention to the aesthetic side of the PowerPoint files and were willing to use more special effects like fonts, background, colours and images. Therefore, they scored higher in the "create" dimension.

*Table 9.54 Mean scores of 8 IL indicators in Chinese Language PA at Secondary schools with regard to gender*

| Chinese Language IL Indicators | Male Mean | Male (SD) | Female Mean | Female (SD) | F | Sig. |
|---|---|---|---|---|---|---|
| **Define** | 1.15 | (0.74) | 1.14 | (0.75) | 0.04 | 0.85 |
| **Access** | 7.10 | (3.31) | 6.80 | (3.05) | 1.75 | 0.19 |
| **Manage** | 5.48 | (2.68) | 5.69 | (2.70) | 1.17 | 0.28 |
| **Integrate** | 3.54 | (2.51) | 3.56 | (2.62) | 0.01 | 0.92 |
| **Create** | 2.59 | (1.34) | 2.89 | (1.39) | 9.39 | 0.00* |
| **Communicate** | 2.21 | (1.48) | 2.30 | (1.53) | 0.61 | 0.44 |
| **Evaluate** | 2.49 | (1.79) | 2.30 | (1.70) | 2.57 | 0.11 |
| **Total** | 24.58 | (9.59) | 24.68 | (9.55) | 0.021 | 0.89 |
| N | 396 | | 410 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

## 9.7.2 Years of Experience in Using Computer

### *9.7.2.1 Science*

When examining the years of experience in using computer and their IL competences in Science PA, it was found that students with 5 to 6 years of experience and 7 years or above of experience in using computer had the same highest mean scores in the "integrate" dimension. Those with 5 to 6 years of experience had the highest mean scores in the "evaluate" dimension and the "total" score. For the students with 1 to 2 years of experience in using computers, they had higher mean scores in the "define" and "access" dimensions. Those who had never used any computer before got the lowest mean scores in all the 8 IL indicators except "communicate". However, all the results were not statistically significant.

*Table 9.55 Mean scores of 8 IL indicators in Science PA at secondary schools with regard to the years of experience in using computer*

| Science IL Indicators \ Experience of Computer Use | I have never used any Computer before | | Less than 1 year | | 1 to 2 years | | 3 to 4 years | | 5 to 6 years | | 7 years or above | | F | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | Mean | (SD) | Mean | (SD) | Mean | (SD) | Mean | (SD) | | |
| **Define** | 1.20 | (1.30) | 2.36 | (1.60) | 3.33 | (1.75) | 3.08 | (1.75) | 3.02 | (1.95) | 2.81 | (1.92) | 2.10 | 0.06 |
| **Access** | 1.60 | (1.14) | 1.71 | (2.02) | 2.49 | (1.78) | 2.28 | (1.99) | 2.33 | (1.97) | 2.24 | (1.81) | 0.55 | 0.74 |
| **Manage** | 1.20 | (0.84) | 2.36 | (2.21) | 1.55 | (1.46) | 1.73 | (1.69) | 1.77 | (1.70) | 1.79 | (1.65) | 0.66 | 0.66 |
| **Integrate** | 0.00 | (0.00) | 1.86 | (2.74) | 1.80 | (2.45) | 2.07 | (2.77) | 2.19 | (2.85) | 2.19 | (2.84) | 0.81 | 0.54 |
| **Create** | 0.20 | (0.45) | 0.71 | (1.07) | 0.35 | (0.48) | 0.42 | (0.64) | 0.43 | (0.74) | 0.50 | (0.76) | 1.08 | 0.37 |
| **Communicate** | 1.20 | (0.84) | 0.43 | (0.76) | 0.84 | (0.85) | 0.82 | (0.83) | 0.75 | (0.79) | 0.72 | (0.80) | 1.17 | 0.32 |
| **Evaluate** | 0.00 | (0.00) | 0.14 | (0.53) | 0.35 | (0.75) | 0.50 | (1.08) | 0.51 | (1.09) | 0.48 | (1.03) | 0.72 | 0.61 |
| **Total** | 5.40 | (2.07) | 9.57 | (5.65) | 10.69 | (5.42) | 10.89 | (6.07) | 11.00 | (6.00) | 10.74 | (5.99) | 1.02 | 0.41 |
| N | 5 | | 14 | | 49 | | 213 | | 282 | | 257 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### *9.7.2.2 Technical*

In primary schools, statistically significant differences in the performance of students with various years of experience in using computer were found in the indicators of “define”, “manage”, “integrate” and “total” score.

For the Post-hoc tests (Appendix 9.5), in the dimension of “define”, it was found that students with 5 to 6 years experience in using computer had significantly higher mean scores than those with 1 to 2 years of experience. For “integrate”, students with 7 years or above experience in using computer had significantly higher mean scores than those with 5 to 6 years of experience. For “manage” and “total” score, students with 7 years or above experience in using computer had significantly higher mean scores than those with less than 1 year and those with 1 to 2 years of experience.

*Table 9.56 Mean scores of 8 IL indicators in Technical PA at primary schools with regard to the years of experience in using computer*

| Experience of Computer Use / Technical IL Indicators | I have never used any Computer before | | Less than 1 year | | 1 to 2 years | | 3 to 4 years | | 5 to 6 years | | 7 years or above | | F | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean (SD) | | Mean (SD) | | Mean (SD) | | Mean (SD) | | Mean (SD) | | Mean (SD) | | | |
| **Define** | 0.25 | (0.50) | 0.93 | (1.23) | 0.88 | (1.16) | 1.02 | (1.18) | 1.33 | (1.28) | 1.27 | (1.27) | 3.62 | 0.00* |
| **Access** | 5.00 | (3.46) | 6.63 | (2.17) | 6.87 | (2.11) | 7.12 | (2.04) | 6.72 | (2.45) | 7.14 | (2.25) | 1.76 | 0.12 |
| **Manage** | 2.63 | (2.36) | 1.92 | (2.13) | 2.22 | (1.83) | 2.58 | (1.90) | 2.56 | (2.04) | 3.06 | (1.94) | 3.56 | 0.00* |
| **Integrate** | 1.50 | (1.22) | 0.28 | (0.68) | 0.53 | (1.04) | 0.61 | (1.00) | 0.55 | (1.04) | 0.89 | (1.29) | 3.65 | 0.00* |
| **Create** | 0.50 | (0.58) | 0.13 | (0.43) | 0.11 | (0.34) | 0.25 | (0.54) | 0.24 | (0.54) | 0.27 | (0.52) | 1.98 | 0.08 |
| **Communicate** | 0.00 | (0.00) | 0.03 | (0.18) | 0.15 | (0.42) | 0.06 | (0.28) | 0.10 | (0.37) | 0.11 | (0.40) | 1.26 | 0.28 |
| **Evaluate** | 1.75 | (1.66) | 2.52 | (1.99) | 3.00 | (1.86) | 3.10 | (1.80) | 3.02 | (2.08) | 3.34 | (2.05) | 1.56 | 0.17 |
| **Total** | 11.63 | (5.91) | 12.45 | (5.95) | 13.76 | (6.09) | 14.73 | (5.93) | 14.52 | (6.73) | 16.08 | (6.45) | 3.19 | 0.01* |
| N | 4 | | 30 | | 115 | | 251 | | 225 | | 176 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

In secondary schools, statistically significant differences in the performance of students with various years of experience in using computer were found in the indicators of “define”, “create”, “evaluate” and “total” score. Students with 7 years or above experience in using computer had significantly higher mean score in “create”, “evaluate” and “total” score whereas students with 1 to 2 years of experiences had significantly higher mean score in “define”.

For the Post-hoc tests (Appendix 9.6), for “create” dimension, it was found that students with 7 years or above experience in using computer had significantly higher mean scores than those with 1 to 2 years of experience. For “evaluate”, it was found that students with 3 years or above of experience in using computer had significantly higher mean scores than those with 1 to 2 years of experience. For the “total” score, it was found that students with 7 years or above experience in using computer had significantly higher mean scores than those without any experience and those with 1 to 2 years of experience.

*Table 9.57 Mean scores of 8 IL indicators in Technical PA at secondary schools with regard to the years of experience in using computer*

| Experience of Computer Use / Technical IL Indicators | I have never used any Computer before | | Less than 1 year | | 1 to 2 years | | 3 to 4 years | | 5 to 6 years | | 7 years or above | | F | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | Mean | (SD) | Mean | (SD) | Mean | (SD) | Mean | (SD) | | |
| **Define** | 0.83 | (1.33) | 1.00 | (1.31) | 2.09 | (1.18) | 2.07 | (1.16) | 2.00 | (1.16) | 2.04 | (1.18) | 2.62 | 0.02* |
| **Access** | 6.83 | (2.79) | 8.25 | (1.04) | 7.40 | (1.93) | 7.99 | (1.56) | 8.00 | (1.50) | 7.91 | (1.53) | 2.07 | 0.07 |
| **Manage** | 2.67 | (2.36) | 4.56 | (1.84) | 4.47 | (1.99) | 4.65 | (2.03) | 4.70 | (1.93) | 4.85 | (1.95) | 1.76 | 0.12 |
| **Integrate** | 0.83 | (1.03) | 1.19 | (1.22) | 1.36 | (1.50) | 1.71 | (1.52) | 1.76 | (1.55) | 1.92 | (1.56) | 2.01 | 0.07 |
| **Create** | 0.50 | (0.55) | 0.50 | (0.53) | 0.21 | (0.49) | 0.49 | (0.79) | 0.50 | (0.71) | 0.60 | (0.81) | 2.53 | 0.03* |
| **Communicate** | 0.33 | (0.52) | 0.13 | (0.35) | 0.34 | (0.65) | 0.27 | (0.58) | 0.27 | (0.55) | 0.33 | (0.62) | 0.58 | 0.72 |
| **Evaluate** | 3.67 | (2.44) | 5.69 | (1.62) | 4.54 | (2.56) | 5.76 | (2.57) | 5.94 | (2.50) | 6.14 | (2.45) | 4.68 | 0.00* |
| **Total** | 15.67 | (6.51) | 21.31 | (3.37) | 20.41 | (6.66) | 22.94 | (6.85) | 23.17 | (6.63) | 23.78 | (6.42) | 4.01 | 0.00* |
| N | 6 | | 8 | | 53 | | 205 | | 259 | | 274 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05..

### *9.7.2.3 Mathematics*

Statistically significant differences in the performance of students with various years of experience in using computer were found in all 8 IL indicators except in the "evaluate" dimension (Table 9.58) It was interesting to note that students with 5 to 6 years of experience in using computer had highest mean scores in the dimensions of "define", "access", "integrate" and "create" as well as the "total" score (2.00, 4.76, 2.67 4.61 and 18.22 respectively). Results of a Post-hoc tests (Appendix 9.7) showed significant effect of 5 to 6 years of computer experience in the dimension of "access" (mean differences and significance with less than 1 year, 1 to 2 years, and 7 years or above were 1.08 and 0.04; 1.10 and 0.00; as well as 0.73 and 0.01 respectively).

*Table 9.58 Mean scores of 8 IL indicators in Mathematics PA at primary schools with regard to the years of experience in using computer*

| Years of Computer Use / Mathematics IL Indicators | I have never used any Computer before | Less than 1 year | 1 to 2 years | 3 to 4 years | 5 to 6 years | 7 years or above | F | Sig. |
|---|---|---|---|---|---|---|---|---|
| | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) | | |
| **Define** | 1.75 (0.50) | 1.63 (0.99) | 1.70 (1.16) | 1.84 (0.99) | 2.00 (0.94) | 1.70 (1.01) | 2.65 | 0.02* |
| **Access** | 3.50 (3.00) | 3.68 (2.49) | 3.66 (2.15) | 4.21 (2.07) | 4.76 (1.99) | 4.03 (2.29) | 5.26 | 0.00* |
| **Manage** | 1.25 (1.26) | 2.56 (2.29) | 3.43 (2.11) | 3.33 (2.23) | 3.26 (2.33) | 3.67 (2.30) | 2.47 | 0.03* |
| **Integrate** | 0.75 (1.50) | 1.95 (1.69) | 1.98 (1.86) | 2.35 (1.92) | 2.67 (1.98) | 2.36 (2.01) | 2.88 | 0.01* |
| **Create** | 1.00 (2.00) | 3.83 (2.76) | 4.47 (2.91) | 4.04 (2.85) | 4.61 (2.91) | 3.95 (2.95) | 2.69 | 0.02* |
| **Communicate** | 0.50 (1.00) | 0.46 (0.74) | 0.71 (0.93) | 0.80 (0.96) | 0.77 (0.93) | 0.99 (1.04) | 2.67 | 0.02* |
| **Evaluate** | 0.00 (0.00) | 0.10 (0.37) | 0.12 (0.54) | 0.20 (0.71) | 0.14 (0.57) | 0.20 (0.67) | 0.51 | 0.77 |
| **Total** | 8.75 (5.19) | 14.22 (8.00) | 16.07 (7.46) | 16.76 (7.63) | 18.22 (7.55) | 16.90 (8.30) | 3.47 | 0.00* |
| N | 4 | 41 | 99 | 251 | 236 | 172 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### *9.7.2.4 Primary Chinese Language*

Table 9.59 showed that 30.7% of the students had 3 to 4 years of experience in using computer and 28.9% of them had 5 to 6 years of experience in using it. This reflected that most of the students started to use computers during primary schools. It was interesting to note that 23.7% of the students indicated that they had 7 or more years of experience in using computer. This implied they had been using computers since they were 3 to 4 years old. Besides, 5 students indicated that they had not used computer before but had the highest mean scores in the “integrate” and “create” dimension. The task related to the “create” dimension put much emphasis on software such as Word and PowerPoint. Although these students had not used computers before, their mean scores in “create” were higher than the other groups of students. This created some doubts in the authenticity of the answers given in the questionnaire survey. Student who had 3 to 4 years of experience in using computer scored the highest in “communicate” while those who had 5 to 6 years of experience scored the highest in “define” and “manage”. Those who had used computer for 7 years or more scored the highest in “access” and “evaluate”.

The result of the ANOVA showed that the differences in students’ performance were statistically significant in 5 IL indicators, “manage”, “integrate”, “communicate” and “create” as well as “total” score, regarding various years of experience in using computer.

From the result of the Post-hoc tests (Appendix 9.8), the difference in students’ performance in the two IL dimensions, “manage” and “create”, had not yet reached statistically significant level. This implied that there were no significant differences in the performance of students with different years of experience in using the computer. For the “integrate” dimension, there were significant differences between the mean scores of those students who had 7 years or above experience in using computer and those who had 5 to 6 years, 3 to 4 years, 1 to 2 years and less than 1 year of experience. This reflected that students who had 7 years or more experience in using computer performed better in “integrate” than students with 5 to 6 years, 3 to 4 years, 1 to 2 years and less than 1 year of experience in using it.

For the “communicate” dimension, there were significant differences between the mean scores of students who had less than 1 year of experience in using computer and those with 3 to 4 years, 5 to 6 years and 7 years or above of experience. This reflected that students with less than 1 year of experience performed worse than those with 3 to 4 years, 5 to 6 years and 7 years or above experience in using computer.

For the “total” score, there were significant difference between the mean scores of students with less than 1 year of experience in using computer and those with 3 to 4 years, 5 to 6 years and 7 years or above of experience. This reflected that those students with less than 1 year of experience had a lower “total” score than those with 3 to 4 years, 5 to 6 years and 7 years or above experience in using computer.

*Table 9.59 Mean scores of 8 IL indicators in Chinese Language PA at Primary schools with regard to the years of experience in using computer*

| **Chinese Language IL Indicators** | **Years of Computer use** | **I have never used any Computer before** | **Less than 1 year** | **1 to 2 years** | **3 to 4 years** | **5 to 6 years** | **7 years or above** | **F** | **Sig.** |
|---|---|---|---|---|---|---|---|---|---|
| Define | Mean | 0.40 | 1.24 | 1.45 | 1.42 | 1.48 | 1.40 | 1.60 | 0.15 |
| | (SD) | (0.89) | (1.06) | (0.98) | (0.92) | (0.99) | (0.90) | | |
| Access | Mean | 3.20 | 2.91 | 4.15 | 4.57 | 4.78 | 4.91 | 2.15 | 0.06 |
| | (SD) | (2.95) | (3.78) | (3.64) | (3.71) | (3.76) | (3.79) | | |
| Manage | Mean | 2.20 | 1.64 | 1.99 | 2.22 | 2.48 | 2.46 | 2.32 | 0.04* |
| | (SD) | (1.64) | (1.67) | (1.73) | (1.74) | (1.84) | (1.89) | | |
| Integrate | Mean | 3.80 | 1.82 | 2.51 | 2.60 | 2.52 | 3.27 | 5.09 | 0.00* |
| | (SD) | (1.92) | (1.76) | (2.05) | (1.97) | (1.98) | (2.24) | | |
| Create | Mean | 4.00 | 2.15 | 2.36 | 2.76 | 2.51 | 3.04 | 2.67 | 0.02* |
| | (SD) | (1.87) | (1.94) | (2.01) | (2.16) | (2.06) | (2.21) | | |
| Communicate | Mean | 1.20 | 1.58 | 2.27 | 2.60 | 2.58 | 2.50 | 3.60 | 0.00* |
| | (SD) | (0.45) | (1.41) | (1.43) | (1.65) | (1.63) | (1.57) | | |
| Evaluate | Mean | 1.40 | 1.30 | 2.03 | 2.10 | 2.17 | 2.34 | 1.35 | 0.24 |
| | (SD) | (1.67) | (1.99) | (2.18) | (2.30) | (2.29) | (2.39) | | |
| Total | Mean | 16.20 | 12.64 | 16.76 | 18.27 | 18.51 | 19.92 | 3.61 | 0.00* |
| | (SD) | (5.92) | (9.91) | (9.79) | (10.08) | (9.91) | (10.28) | | |
| N | | 5 | 33 | 96 | 245 | 231 | 189 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

#### *9.7.2.5 Secondary Chinese Language*

Table 9.60 showed that 34.9% of the students had 5 to 6 years of experience, 34.1% of them had 7 years or above experience and 23.2% of the students had 3 to 4 years of experience in using computer. This implied that most students had been using computers since primary schools. Except for the “define” dimension in which students with no experience in using computer scored the highest, those with 7 years or above experience in using the computer performed better in all the other IL dimensions and the “total” score.

The result of the ANOVA showed that except for the “define” dimension, significant differences in the performance of students with various years of experience in using computer were found in all the IL indicators. Also, the result of the Post-hoc tests (Appendix 9.9) discovered that the differences in the performance of students with various years of experience were not significant in the “define”, “integrate” and “create” dimensions. This reflected that there were no differences in students’ performance regarding different years of experience in using computer.

For the “access” and “evaluate dimensions, there were significant differences between the mean scores of students with 7 years or above experience in using computer and those with 1 to 2 years of experience. This reflected that students with 7 years or above experience performed better than those with 1 to 2 years of experience in the “access” and “evaluate” dimensions.

For the “manage” dimension, there were significant differences between mean scores of those with 7 years or above experience and those with 1 to 2 years, 3 to 4 years and 5 to 6 years of experience. This reflected that students with 7 years or above experience performed better in the “manage” dimension than students with other years of experience in using computer.

For the “communicate” dimension and the “total” score, there were significant differences between mean scores of students with 7 years or above experience and those with less than 1 year, 1 to 2 years and 3 to 4 years. This reflected that students with 7 years or above experience in using computer performed better in the “communicate” dimension and the “total” score than those with less than 1 year, 1 to 2 years and 3 to 4 years of experience.

*Table 9.60 Mean scores of 8 IL indicators in Chinese Language PA at secondary schools with regard to the years of experience in using computer*

| Chinese Language IL Indicators \ Experience of Computer Use | | I have never used any Computer before | Less than 1 year | 1 to 2 years | 3 to 4 years | 5 to 6 years | 7 years or above | F | Sig. |
|---|---|---|---|---|---|---|---|---|---|
| Define | Mean | 1.67 | 1.00 | 1.15 | 1.13 | 1.15 | 1.15 | 0.68 | 0.64 |
| | (SD) | (0.52) | (0.89) | (0.84) | (0.75) | (0.76) | (0.71) | | |
| Access | Mean | 4.33 | 4.91 | 5.72 | 6.80 | 7.00 | 7.33 | 4.08 | 0.00* |
| | (SD) | (3.78) | (2.84) | (3.59) | (2.86) | (3.22) | (3.19) | | |
| Manage | Mean | 4.17 | 4.27 | 4.89 | 5.37 | 5.41 | 6.12 | 4.19 | 0.00* |
| | (SD) | (1.60) | (3.13) | (2.80) | (2.73) | (2.69) | (2.57) | | |
| Integrate | Mean | 2.00 | 2.27 | 2.78 | 3.24 | 3.60 | 3.93 | 3.63 | 0.00* |
| | (SD) | (2.61) | (2.10) | (2.16) | (2.54) | (2.64) | (2.51) | | |
| Create | Mean | 2.50 | 2.64 | 2.28 | 2.59 | 2.77 | 2.90 | 2.32 | 0.04* |
| | (SD) | (0.84) | (1.69) | (1.20) | (1.38) | (1.34) | (1.40) | | |
| Communicate | Mean | 1.33 | 1.18 | 1.65 | 2.06 | 2.28 | 2.53 | 5.61 | 0.00* |
| | (SD) | (0.82) | (1.17) | (1.12) | (1.42) | (1.53) | (1.56) | | |
| Evaluate | Mean | 1.50 | 2.09 | 1.83 | 2.32 | 2.30 | 2.67 | 2.97 | 0.01* |
| | (SD) | (1.76) | (1.51) | (1.78) | (1.73) | (1.74) | (1.74) | | |
| Total | Mean | 17.50 | 18.36 | 20.30 | 23.52 | 24.52 | 26.63 | 6.65 | 0.00* |
| | (SD) | (6.95) | (9.12) | (8.75) | (9.21) | (9.84) | (9.19) | | |
| N | | 6 | 11 | 46 | 187 | 281 | 275 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### 9.7.3 Access to Computer at Home

#### *9.7.3.1 Science*

The mean scores of IL in Science PA were presented in Table 9.61. Those who could not use computer at home had the lowest mean scores in all the 7 IL dimensions and the “total” score as well.

It was interesting to note that for those who shared the computer with someone at home had higher scores in the dimensions of “define”, “access” and “create”. The finding in “access” was statistically significant (F (2,817)=3.23, P. <0.05). Those who did not need to share the computer got higher mean scores in the other 4 dimensions and the “total” score. Results from the ANOVA indicated that there were significant differences in the total scores amongst the 3 groups of students (F (2,817)=4.31, p<0.05).

*Table 9.61 Mean scores of 8 IL indicators in Science PA at secondary schools with regard to computer ownership*

| Science IL Indicators \ Access to Computer at Home | **Yes, it is used by me only** | | **Yes, but I share it with someone** | | **No (Can not access to computer at home)** | | **F** | **Sig.** |
|---|---|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | Mean | (SD) | | |
| **Define** | 2.93 | (1.85) | 3.01 | (1.89) | 2.24 | (1.86) | 1.51 | 0.22 |
| **Access** | 2.24 | (1.95) | 2.35 | (1.89) | 1.18 | (1.47) | 3.23 | 0.04* |
| **Manage** | 1.81 | (1.79) | 1.75 | (1.60) | 1.35 | (1.73) | 0.62 | 0.54 |
| **Integrate** | 2.16 | (2.90) | 2.13 | (2.77) | 0.76 | (1.30) | 2.04 | 0.13 |
| **Create** | 0.44 | (0.73) | 0.45 | (0.71) | 0.24 | (0.75) | 0.78 | 0.46 |
| **Communicate** | 0.83 | (0.80) | 0.73 | (0.81) | 0.59 | (0.87) | 1.96 | 0.14 |
| **Evaluate** | 0.58 | (1.14) | 0.43 | (0.98) | 0.29 | (0.85) | 2.28 | 0.10 |
| **Total** | 10.98 | (6.34) | 10.85 | (5.74) | 6.65 | (4.55) | 4.31 | 0.01* |
| N | 288 | | 515 | | 17 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

Post-hoc tests (Appendix 9.10) were conducted to identify statistically significant differences between groups. In the “access” dimension, there was significant difference in the mean score between those who did not have computer access and those with computer access but needed to share with someone. There were significant differences between those who did not have computer access at home and those who had access at home in terms of the “total” score.

### *9.7.3.2 Technical*

For the primary school students, when examining the computer ownership and the mean scores of 7 dimensions and the “total” score of IL in Technical PA, it was found that students who could not access to computer at home had lower scores in all dimensions. (Table 9.62) However, similar mean scores were found in each dimension between students who shared the computer with someone and those who used their own computer at home but only in the dimension of “manage” were the differences amongst the three groups of students with various modes of computer ownership significant.

For the Post-hoc tests (Appendix 9.11), for “manage”, it was found that students who shared the computer with someone at home or owned by themselves had significantly higher mean scores than those without any computers at home.

*Table 9.62 Mean scores of 8 IL indicators in Technical PA at primary schools with regard to computer ownership*

| Technical IL Indicators \ Access to Computer at Home | Yes, it is used by me only | Yes, but I share it with someone | No (Can not access to computer at home) | F | Sig. |
|---|---|---|---|---|---|
| | Mean (SD) | Mean (SD) | Mean (SD) | | |
| **Define** | 1.17 (1.22) | 1.13 (1.24) | 1.00 (1.30) | 0.27 | 0.77 |
| **Access** | 6.97 (2.08) | 6.96 (2.27) | 6.44 (2.74) | 0.71 | 0.49 |
| **Manage** | 2.43 (1.88) | 2.72 (1.98) | 1.41 (1.93) | 7.00 | 0.00* |
| **Integrate** | 0.70 (1.17) | 0.62 (1.06) | 0.39 (0.80) | 1.08 | 0.34 |
| **Create** | 0.21 (0.46) | 0.24 (0.52) | 0.15 (0.60) | 0.59 | 0.55 |
| **Communicate** | 0.11 (0.37) | 0.09 (0.35) | 0.07 (0.27) | 0.46 | 0.63 |
| **Evaluate** | 3.13 (1.97) | 3.10 (1.96) | 2.50 (1.79) | 1.28 | 0.28 |
| **Total** | 14.73 (6.15) | 14.86 (6.36) | 11.96 (7.14) | 2.70 | 0.07 |
| N | 210 | 564 | 27 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

For the secondary school students, when examining the computer ownership and the mean scores of 8 IL indicators in Technical PA, it was found that students who could not access to computer at home had lower scores in all dimensions except for the dimension of "communicate" (Table 9.63). ANOVA showed that results in "access" and "communicate" dimensions were statistically significant. For the Post-hoc tests (Appendix 9.12), no statistically significant difference between groups was found.

*Table 9.63 Mean scores of 8 IL indicators in Technical PA at secondary schools with regard to computer ownership*

| Technical IL Indicators \ Access to Computer at Home | Yes, it is used by me only | Yes, but I share it with someone | No (Cannot access to computer at home) | F | Sig. |
|---|---|---|---|---|---|
| | Mean(SD) | Mean(SD) | Mean(SD) | | |
| **Define** | 2.01 (1.18) | 2.03 (1.17) | 1.82 (1.40) | 0.18 | 0.83 |
| **Access** | 7.79 (1.71) | 8.01 (1.47) | 7.18 (1.94) | 3.10 | 0.05* |
| **Manage** | 4.63 (2.00) | 4.77 (1.95) | 3.73 (2.26) | 1.83 | 0.16 |
| **Integrate** | 1.79 (1.56) | 1.75 (1.53) | 1.50 (1.58) | 0.23 | 0.80 |
| **Create** | 0.53 (0.74) | 0.51 (0.77) | 0.09 (0.30) | 1.78 | 0.17 |
| **Communicate** | 0.34 (0.64) | 0.26 (0.54) | 0.55 (0.93) | 3.10 | 0.05* |
| **Evaluate** | 5.69 (2.71) | 5.97 (2.39) | 4.45 (2.93) | 2.89 | 0.06 |
| **Total** | 22.79 (7.04) | 23.31 (6.39) | 19.32 (7.33) | 2.33 | 0.10 |
| N | 294 | 500 | 11 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

#### *9.7.3.3 Mathematics*

Regarding computer ownership and 8 IL indicators in Mathematics, Table 9.64 indicated that students who had computers at home and solely owned by themselves had higher mean scores in "access", "manage", "create", "integrate" and the "total" score. The result of "access" was also statistically significant. The Post-hoc tests (Appendix 9.13) indicated that in the "access" dimension, significant differences were found among the sole owners and those who did not have computer access at home. For "manage" and "integrate" dimensions, significant differences were also found among those who did not have computer at home and those who had computer at home either solely owned or shared with others.

*Table 9.64 Mean scores of 8 IL indicators in Mathematics PA at primary schools with regard to computer ownership*

| Access to Computer at Home / Mathematics IL Indicators | Yes, it is used by me only | Yes, but I share it with someone | No (Cannot access to computer at home) | F | Sig. |
|---|---|---|---|---|---|
| | Mean (SD) | Mean (SD) | Mean (SD) | | |
| **Define** | 1.79 (1.04) | 1.85 (0.99) | 1.78 (1.11) | 0.33 | 0.72 |
| **Access** | 4.34 (2.15) | 4.23 (2.16) | 3.06 (2.21) | 2.93 | 0.05* |
| **Manage** | 3.42 (2.10) | 3.37 (2.32) | 1.61 (1.97) | 5.48 | 0.00* |
| **Integrate** | 2.53 (1.99) | 2.36 (1.94) | 1.06 (1.16) | 4.85 | 0.01* |
| **Create** | 4.25 (2.94) | 4.23 (2.89) | 3.22 (2.80) | 1.08 | 0.34 |
| **Communicate** | 0.84 (0.96) | 0.80 (0.96) | 0.33 (0.84) | 2.35 | 0.10 |
| **Evaluate** | 0.15 (0.60) | 0.17 (0.64) | 0.11 (0.47) | 0.15 | 0.86 |
| **Total** | 17.32 (7.76) | 17.01 (7.80) | 11.71 (6.49) | 5.26 | 0.01* |
| N | 217 | 568 | 18 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

#### *9.7.3.4 Primary Chinese Language*

Table 9.65 showed that 68.7% of the students indicated that they had computer at home but needed to share with someone, 28% of the students indicated that they had a computer solely owned by themselves and 3.3% of the students indicated that they could not access to computer at home. For the "integrate" dimension, students who had their own computer got higher mean scores while those who had computer at home but needed to share with someone had higher mean scores in other IL dimensions and the "total" score. The result of the ANOVA showed that except for the "define" dimension, the differences in students' performance were statistically significant in the other IL dimensions and in the "total" score.

*Table 9.65 Mean scores of 8 IL indicators in Chinese Language PA at primary schools with regard to computer ownership*

| Chinese Language IL indicators \ Access to Computer at Home | **Yes, it is used by me only** | | **Yes, but I share it with someone** | | **No (Can not access to computer at home)** | | **F** | **Sig.** |
|---|---|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | Mean | (SD) | | |
| **Define** | 1.42 | (0.96) | 1.43 | (0.95) | 1.35 | (0.98) | 0.08 | 0.92 |
| **Access** | 4.51 | (3.86) | 4.75 | (3.71) | 1.77 | (2.27) | 8.03 | 0.00* |
| **Manage** | 2.18 | (1.92) | 2.40 | (1.76) | 1.27 | (1.59) | 5.55 | 0.00* |
| **Integrate** | 2.80 | (2.09) | 2.71 | (2.06) | 1.70 | (1.74) | 3.39 | 0.03* |
| **Create** | 2.48 | (2.12) | 2.81 | (2.12) | 1.96 | (2.03) | 3.47 | 0.03* |
| **Communicate** | 2.21 | (1.43) | 2.61 | (1.64) | 1.96 | (1.75) | 6.47 | 0.00* |
| **Evaluate** | 1.92 | (2.25) | 2.26 | (2.32) | 1.19 | (1.70) | 4.00 | 0.02* |
| **Total** | 17.53 | (10.30) | 18.95 | (9.95) | 11.19 | (8.68) | 8.38 | 0.00* |
| N | 224 | | 549 | | 26 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

Post-hoc tests (Appendix 9.14) showed that the difference in students' performances in the "create" and "evaluate" dimensions were not statistically significant. This reflected that there were no differences in the performance of students regarding the computer ownership. For "access", "manage" and "integrate" as well as the "total" score, there were significant differences in the mean scores between students who had no computer access at home and the other two groups who could. This showed that students who had computer access at home, either solely owned or shared with others, performed better than students who could not access to computer at home in the dimensions of "access", "manage" and "integrate" as well as in the "total" score. For the "communicate" dimension, there were significant differences in the performance of students who had a solely owned computer at home and those who needed to share the computer with someone ($p<0.01$). This reflected that for this dimension, students with a computer shared with others performed better than students who had a solely owned computer.

#### *9.7.3.5 Secondary Chinese Language*

Table 9.66 showed that 63.2% of the students indicated that they had a computer at home shared with someone, 35.4% of the students indicated that they had a solely owned computer and1.5% of the students indicated that they could not access to computers at home. If we compared the mean scores, students who had solely owned computers had higher mean scores in "define" and "integrate" while students who had a computer shared with someone performed better in the other IL dimensions and the "total" score. The result of ANOVA showed that except for "define" and "evaluate", the differences in students' performance in the other IL dimensions and the "total" score were statistically significant.

*Table 9.66 Mean scores of 8 IL indicators in Chinese Language PA at secondary schools with regard to computer ownership*

| Chinese Language IL Indicators \ Access to Computer at Home | Yes, it is used by me only Mean (SD) | | Yes, but I share it with someone Mean (SD) | | No (Cannot access to computer at home) Mean (SD) | | F | Sig. |
|---|---|---|---|---|---|---|---|---|
| **Define** | 1.18 | (0.75) | 1.13 | (0.74) | 1.08 | (0.79) | 0.36 | 0.70 |
| **Access** | 6.72 | (3.20) | 7.14 | (3.14) | 4.50 | (3.26) | 5.25 | 0.00* |
| **Manage** | 5.40 | (2.65) | 5.73 | (2.69) | 4.00 | (3.19) | 3.49 | 0.03* |
| **Integrate** | 3.59 | (2.51) | 3.58 | (2.59) | 1.67 | (1.78) | 3.32 | 0.04* |
| **Create** | 2.70 | (1.41) | 2.79 | (1.34) | 1.75 | (1.48) | 3.60 | 0.03* |
| **Communicate** | 2.19 | (1.48) | 2.32 | (1.53) | 1.25 | (0.62) | 3.47 | 0.03* |
| **Evaluate** | 2.35 | (1.73) | 2.43 | (1.76) | 1.67 | (1.61) | 1.25 | 0.29 |
| **Total** | 24.12 | (9.61) | 25.12 | (9.44) | 15.92 | (8.82) | 6.14 | 0.00* |
| N | 285 | | 509 | | 12 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

Post-hoc tests (Appendix 9.15) showed that the difference in students' performance in the "manage" dimension was not significant. This implied that there were no differences in students' performance in the "manage" dimension between students who could not access to computer at home and those with computer access at home, either solely owned or shared with someone. For "access", "integrate", "create" and the "total" score, there were significant differences in the mean scores between students who could not access to computer at home and the other two groups who could. This reflected that students who had computer access at home, either solely owned or shard with someone, performed better than those who could not access to computers at home. For "communicate", there were significant differences in the performance of students who could not access to computers at home and those who had computer shared with someone. This reflected that for this dimension, those students who had computer at home shared with others performed better than those could not access to computer at home.

### 9.7.4 Duration of Daily Computer Use at Home

#### *9.7.4.1 Science*

As shown in Table 9.67, students who used computer 2 to 4 hours daily had better performance in the "define" dimension of Science PA. For "access", better performance was found for those students who used computer 5 to 7 hours per day at home daily. For "manage", students who used 5 to 7 hours of computer daily had higher mean scores. For "integrate", better performance was found in the group who used less than 2 hours a day. For "create", the best performance was found in the group using computer less than 2 hours daily while for "evaluate", the best performance was found in the group using computer 5 to 7 hours daily. For the "communicate" dimension, although those who used the computer for 2 to 4 hours had a score that was 0.01 marks higher than those who used the computer for 5 to 7 hours, in general the longer the duration that computer was used, the better the performance was noted and results were statistically significant. According to the Post-hoc tests (Appendix 9.16), statistically significant differences were found between those who had used computer for more than 7 hours per day at home and those who had not used computer at home per day in the dimension of "communicate".

*Table 9.67 Mean scores of 8 IL indicators in Science PA at secondary schools with regard to duration of computer use per day*

| Duration of Daily Computer Use / Science IL Indicators | Nil | | Less than 2 hours | | 2 to 4 hours | | 5 to 7 hours | | More than 7 hours | | F | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | Mean | (SD) | Mean | (SD) | Mean | (SD) | | |
| **Define** | 2.49 | (1.73) | 3.01 | (1.89) | 3.12 | (1.87) | 3.04 | (1.79) | 2.71 | (1.96) | 1.75 | 0.14 |
| **Access** | 2.02 | (1.77) | 2.30 | (1.91) | 2.24 | (1.91) | 2.55 | (1.98) | 2.30 | (1.90) | 0.80 | 0.52 |
| **Manage** | 1.66 | (1.68) | 1.83 | (1.69) | 1.82 | (1.80) | 1.83 | (1.63) | 1.50 | (1.31) | 0.99 | 0.41 |
| **Integrate** | 1.56 | (2.45) | 2.31 | (3.08) | 2.19 | (2.77) | 2.15 | (2.70) | 1.87 | (2.51) | 0.95 | 0.44 |
| **Create** | 0.46 | (0.71) | 0.49 | (0.76) | 0.45 | (0.73) | 0.33 | (0.57) | 0.48 | (0.72) | 1.20 | 0.31 |
| **Communicate** | 0.51 | (0.71) | 0.74 | (0.80) | 0.76 | (0.80) | 0.75 | (0.81) | 0.95 | (0.85) | 2.58 | 0.04* |
| **Evaluate** | 0.27 | (0.74) | 0.49 | (1.05) | 0.42 | (0.97) | 0.61 | (1.13) | 0.55 | (1.16) | 1.28 | 0.28 |
| **Total** | 8.98 | (5.11) | 11.18 | (6.04) | 11.00 | (6.20) | 11.26 | (5.65) | 10.36 | (5.75) | 1.58 | 0.18 |
| N | 41 | | 253 | | 270 | | 123 | | 116 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

#### *9.7.4.2 Technical*

For the primary school students, when examining the relationship between the duration in using computer daily and the mean scores of the 8 IL indicators, it was found that students who used 5 to 7 hours per day had significantly higher scores in "manage", "integrate", "evaluate" as well as the "total" score. Students who used 2 to 4 hours per day performed significantly better in "define" and "communicate".

For the Post-hoc tests (Appendix 9.17), it was interesting to note that statistically significant results were found in most dimensions of IL. For "define", it was found that students who used computer for more than 7 hours a day had significantly lower scores than those who used computer for 2 to 4 hours a day. Besides, students who used computer for 2 to 4 hours daily had significantly higher mean scores than those using computer for less than 2 hours daily.

For "integrate", "manage" and the "total" score, it was found that students who used computer for 2 to 7 hours daily had significantly higher mean scores than those who did not use computers daily; those who had used computers for 5 to 7 hours daily had significantly higher mean scores than those using computer for less than 2 hours. For "communicate", it was found that students who used computer for 2 to 4 hours daily had significantly higher mean scores than those students who did not use computer daily. For "evaluate", it was found that students who used computer for 5 to 7 hours daily had significantly higher mean scores than those using computer for less than 2 hours per day and those who did not use computers.

*Table 9.68 Mean scores of 8 IL indicators in Technical PA at primary schools with regard to duration of computer use per day*

| **Duration of Daily Computer Use** / **Technical IL Indicators** | **Nil** | | **Less than 2 hours** | | **2 to 4 hours** | | **5 to 7 hours** | | **More than 7 hours** | | **F** | **Sig.** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean(SD) | | Mean(SD) | | Mean(SD) | | Mean(SD) | | Mean(SD) | | | |
| **Define** | 0.96 | (1.18) | 1.07 | (1.22) | 1.40 | (1.32) | 1.22 | (1.14) | 0.81 | (1.11) | 3.76 | 0.00* |
| **Access** | 6.65 | (2.27) | 6.83 | (2.33) | 7.20 | (2.20) | 7.26 | (1.87) | 7.26 | (1.56) | 1.87 | 0.11 |
| **Manage** | 1.98 | (1.83) | 2.58 | (1.97) | 2.82 | (1.96) | 3.28 | (1.84) | 2.57 | (1.90) | 5.02 | 0.00* |
| **Integrate** | 0.29 | (0.70) | 0.57 | (1.04) | 0.79 | (1.20) | 0.99 | (1.31) | 0.68 | (1.00) | 5.49 | 0.00* |
| **Create** | 0.17 | (0.41) | 0.23 | (0.52) | 0.19 | (0.46) | 0.35 | (0.58) | 0.26 | (0.54) | 1.64 | 0.16 |
| **Communicate** | 0.02 | (0.15) | 0.08 | (0.32) | 0.15 | (0.46) | 0.13 | (0.38) | 0.07 | (0.26) | 2.57 | 0.04* |
| **Evaluate** | 2.69 | (1.66) | 2.98 | (1.94) | 3.26 | (2.04) | 3.79 | (2.11) | 3.11 | (1.71) | 3.97 | 0.00* |
| **Total** | 12.77 | (5.22) | 14.34 | (6.35) | 15.83 | (6.64) | 17.02 | (5.95) | 14.76 | (5.06) | 6.47 | 0.00* |
| N | 82 | | 383 | | 190 | | 76 | | 42 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

For the secondary school students, when examining the mean scores of the 7 dimensions of IL in Technical PA, students who spent more than 7 hours daily on computers performed better in "manage", "integrate" and "communicate" and shared the same highest "total" score with those who spent 2 to 4 hours daily on computer. No significant difference was found among groups of students with different duration of daily computer use.

*Table 9.69 Mean scores of 8 IL indicators in Technical PA at secondary schools with regard to duration of computer use per day*

| Technical IL Indicators \ Duration of Computer Daily Use | Nil | | Less than 2 hours | | 2 to 4 hours | | 5 to 7 hours | | More than 7 hours | | F | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean(SD) | | Mean(SD) | | Mean(SD) | | Mean(SD) | | Mean(SD) | | | |
| **Define** | 1.97 | (1.28) | 2.07 | (1.17) | 2.07 | (1.16) | 1.83 | (1.18) | 1.98 | (1.16) | 1.02 | 0.40 |
| **Access** | 7.79 | (1.77) | 8.01 | (1.53) | 7.97 | (1.56) | 7.81 | (1.64) | 7.85 | (1.52) | 0.53 | 0.71 |
| **Manage** | 4.47 | (2.27) | 4.46 | (2.09) | 4.87 | (1.88) | 4.84 | (1.96) | 4.87 | (1.79) | 1.94 | 0.10 |
| **Integrate** | 1.30 | (1.63) | 1.70 | (1.50) | 1.81 | (1.57) | 1.71 | (1.40) | 1.97 | (1.61) | 1.62 | 0.17 |
| **Create** | 0.32 | (0.62) | 0.52 | (0.77) | 0.52 | (0.74) | 0.55 | (0.83) | 0.53 | (0.75) | 0.75 | 0.56 |
| **Communicate** | 0.21 | (0.47) | 0.29 | (0.59) | 0.27 | (0.55) | 0.29 | (0.60) | 0.35 | (0.64) | 0.54 | 0.70 |
| **Evaluate** | 5.54 | (2.90) | 5.95 | (2.52) | 5.90 | (2.53) | 5.73 | (2.34) | 5.86 | (2.54) | 0.31 | 0.87 |
| **Total** | 21.61 | (7.42) | 23.00 | (6.75) | 23.41 | (6.64) | 22.76 | (6.54) | 23.41 | (6.28) | 0.78 | 0.54 |
| N | 38 | | 245 | | 275 | | 103 | | 133 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### *9.7.4.3 Mathematics*

The relationship between the duration of daily computer use the week before the assessment and the students' performance in the dimensions of IL in Mathematics PA could reflect how the duration affected the students' performance. Statistically significant differences were found amongst the performance of the 5 groups of students with different duration in all IL indicators (Table 9.70). Students spending 5 to 7 hours on computer got higher mean scores in the "access", "integrate", "create" and "evaluate" dimensions and the "total" score. The scores of those using computer 2 to 4 hours daily were higher in the "define" and "manage" dimensions. Those in the category of using computer more than 7 hours per day had better performance in the dimension of "communicate" only. The SD of each category of duration was close and there was quite an even effect of individual category on each dimension of IL. The Post-hoc tests (Appendix 9.18) revealed that mean scores of students who did not use computer were significantly lower than other students who used computer on daily basis in all IL dimensions except "communicate".

*Table 9.70 Mean scores of 8 IL indicators in Mathematics PA at primary schools with regard to duration of computer use per day*

| Mathematics IL Indicators \ Duration of Daily Computer Use | Nil<br>Mean(SD) | Less than 2 hours<br>Mean(SD) | 2 to 4 hours<br>Mean(SD) | 5 to 7 hours<br>Mean(SD) | More than 7 hours<br>Mean(SD) | F | Sig. |
|---|---|---|---|---|---|---|---|
| **Define** | 1.45 (1.17) | 1.84 (1.00) | 1.96 (0.91) | 1.91(0.91) | 1.75(1.12) | 3.93 | 0.00* |
| **Access** | 3.53 (2.22) | 4.10 (2.07) | 4.58 (2.00) | 4.79 (2.28) | 4.60 (2.62) | 5.68 | 0.00* |
| **Manage** | 2.74 (2.15) | 3.26 (2.30) | 3.77 (2.19) | 3.63 (2.18) | 3.54 (2.30) | 3.58 | 0.01* |
| **Integrate** | 1.86 (1.78) | 2.27 (1.85) | 2.62 (1.97) | 3.05 (2.20) | 2.38 (2.11) | 5.00 | 0.00* |
| **Create** | 2.95 (2.96) | 3.99 (2.94) | 4.85 (2.67) | 5.09 (2.56) | 4.50 (3.02) | 9.02 | 0.00* |
| **Communicate** | 0.60 (0.87) | 0.74 (0.94) | 0.92 (0.99) | 0.95 (0.95) | 1.02 (1.08) | 3.19 | 0.01* |
| **Evaluate** | 0.03 (0.16) | 0.14 (0.59) | 0.21 (0.66) | 0.31 (0.93) | 0.17 (0.56) | 2.56 | 0.04* |
| **Total** | 13.15 (6.94) | 16.35 (7.57) | 18.91 (7.30) | 19.74 (7.75) | 17.96 (9.28) | 11.80 | 0.00* |
| N | 80 | 386 | 184 | 87 | 48 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### *9.7.4.4 Primary Chinese Language*

In order to investigate the effect of the duration of daily computer use on the performance of primary 5 students in Chinese Language PA, the questionnaire asked students about the duration of daily computer use at home in the week prior to the conduct of the questionnaire survey. 46.8% of the students spent less than 2 hours in using computer daily, 24.7% spent 2 to 4 hours, 11.4% spent 5 to 6 hours and 11.1% of the students indicated they did not use computer in the past week and 6% of the students spent more than 7 hours in using computer daily.

The results showed that students who spent 5 to 7 hours in using computers in the past week had the highest mean scores in all IL dimensions and the "total" score. The result of ANOVA showed that other than the "communicate" dimension, statistically significant differences were found in students' performance in all the other IL dimensions and the "total" score.

The Post-hoc tests (Appendix 9.19) showed that for the "define" dimension, there was significant difference in the mean scores of students who spent 5 to 7 hours in using computers and those who spent more than 7 hours. This reflected that students who spent 5 to 7 hours in using computer performed better than those who used computer for more than 7 hours daily.

For the "access" dimension, there were significant differences in the mean scores between students who had not used computer and those with other durations including "less than 2 hours", "2 to 4 hours" and "5 to 7 hours". This reflected that in the "access" dimension, except for students who had used computer for more than 7 hours daily, there were significant differences in the mean scores between students who had used computers and those who had not. Students who had used computers performed better than those who had not use computer. For the “integrate” dimension, the significant differences were found in the mean scores between students with 5 to 7 hours of daily computer use and those who had not use computer, with the former type of students performed better. For the “evaluate” dimension, significant differences were found in the mean scores between students who had 5 to 7 hours of daily computer use and those who did not use computer or used 2 to 4 hours daily. This reflected that students who used computer for 5 to 7 hours performed better than those who did not use computer or used 2 to 4 hours daily.

Regarding “manage” and the “total” score, the mean score differences between students who used computer for 5 to 7 hours and those with other durations including “had not use computer”, “less than 2 hours” and “2 to 4 hours” were significant. This reflected that for “manage” and the “total” score, students who used computer for 5 to 7 hours performed better than students with other duration of daily computer use (except for those who used more than 7 hours of computer daily). This implied that 5 to 7 hours of daily use of computer a week prior to the PA had positive impact on students’ performance in “manage” and the “total” score. Either too short or too long the duration of daily computer use did not help students perform better.

*Table 9.71 Mean scores of 8 IL indicators in Chinese Language PA at Primary schools with regard to duration of computer use per day*

| Duration of Daily Computer Use / Chinese Language IL Indicators | Nil | | Less than 2 hours | | 2 to 4 hours | | 5 to 7 hours | | More than 7 hours | | F | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | Mean | (SD) | Mean | (SD) | Mean | (SD) | | |
| **Define** | 1.41 | (0.96) | 1.39 | (0.97) | 1.44 | (0.93) | 1.68 | (0.84) | 1.13 | (1.00) | 2.87 | 0.02* |
| **Access** | 3.16 | (3.13) | 4.84 | (3.69) | 4.58 | (3.72) | 5.67 | (4.08) | 4.74 | (4.04) | 5.38 | 0.00* |
| **Manage** | 2.14 | (1.74) | 2.26 | (1.77) | 2.21 | (1.74) | 2.99 | (1.90) | 2.52 | (2.09) | 3.69 | 0.00* |
| **Integrate** | 2.16 | (1.85) | 2.71 | (2.06) | 2.73 | (2.03) | 3.34 | (2.17) | 2.87 | (2.32) | 3.64 | 0.00* |
| **Create** | 2.27 | (1.82) | 2.81 | (2.14) | 2.50 | (2.12) | 3.14 | (2.18) | 2.89 | (2.28) | 2.60 | 0.03* |
| **Communicate** | 2.42 | (1.58) | 2.46 | (1.63) | 2.52 | (1.63) | 2.70 | (1.40) | 2.43 | (1.53) | 0.49 | 0.74 |
| **Evaluate** | 1.81 | (2.23) | 2.17 | (2.32) | 1.97 | (2.20) | 2.81 | (2.34) | 2.32 | (2.48) | 2.63 | 0.03* |
| **Total** | 15.37 | (8.98) | 18.64 | (9.81) | 17.95 | (9.99) | 22.33 | (10.15) | 18.90 | (12.03) | 5.57 | 0.00* |
| N | 86 | | 362 | | 191 | | 88 | | 46 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### *9.7.4.5 Secondary Chinese Language*

For Secondary schools, 35.4% of the students indicated that the duration of daily computer use 1 week prior to the conduct of the questionnaire survey was 2 to 4 hours. Around 30% of the students used the computer for less than 2 hours a day, 15% of the students used 7 hours or more and 14.7% of the students used 5 to 7 hours. 4.4% of the students showed that they had not used computer.

Students who used computer for 5 to 7 hours performed better in the “define” and “integrate” dimensions while for the other IL dimensions and the “total” score, students with 2 to 4 hours had the best performance. The result of ANOVA showed that students’ performance were statistically significant in the “integrate” and “evaluate” dimensions.

For the Post-hoc tests (Appendix 9.20), significant differences were found in the “evaluate” dimension between students who used computer for “2 to 4 hours” and “7 hours or more daily”. This reflected that for the “evaluate” dimension, students using 2 to 4 hours of computer a day had better performance than those using computers for more than 7 hours daily.

*Table 9.72 Mean scores of 8 IL indicators in Chinese Language PA at secondary schools with regard to duration of computer use per day*

| **Duration of Daily Computer Use** / **Chinese Language IL Indicators** | **Nil** | **Less than 2 hours** | **2 to 4 hours** | **5 to 7 hours** | **More than 7 hours** | **F** | **Sig.** |
|---|---|---|---|---|---|---|---|
| | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) | Mean (SD) | | |
| **Define** | 1.17(0.75) | 1.17(0.76) | 1.12(0.71) | 1.25(0.74) | 1.07(0.79) | 1.05 | 0.38 |
| **Access** | 7.14(2.97) | 6.94(3.12) | 7.32(3.11) | 6.91(3.19) | 6.32(3.34) | 2.23 | 0.06 |
| **Manage** | 5.37(2.51) | 5.46(2.71) | 5.81(2.64) | 5.56(2.60) | 5.58(2.83) | 0.65 | 0.63 |
| **Integrate** | 3.11(2.69) | 3.22(2.54) | 3.82(2.53) | 3.86(2.57) | 3.59(2.59) | 2.43 | 0.05* |
| **Create** | 2.40(1.17) | 2.65(1.34) | 2.88(1.36) | 2.87(1.38) | 2.69(1.43) | 1.77 | 0.13 |
| **Communicate** | 2.14(1.35) | 2.32(1.63) | 2.32(1.49) | 2.13(1.41) | 2.23(1.47) | 0.51 | 0.73 |
| **Evaluate** | 2.20(1.51) | 2.48(1.79) | 2.61(1.70) | 2.15(1.81) | 2.10(1.75) | 2.81 | 0.03* |
| **Total** | 23.54(8.95) | 24.25(9.49) | 25.88(9.37) | 24.74(9.27) | 23.57(10.07) | 1.78 | 0.13 |
| N | 35 | 238 | 281 | 117 | 123 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

## 9.8 Analyses on Students' Achievements in Information Literacy and School Level Factors

In the previous chapters, it was found that there were significant differences across schools with regard to students' IL competences in different subjects. In order to further investigate whether the school level factors would affect students' results or not, ANOVA was also conducted to examine whether the medium of instruction (MOI), location of the school, school sex and operational session as well as students' ability grouping would bring any difference to students' performance in the 7 dimensions of IL and the "total" score. The reason for selecting these factors was based on the assumption that these factors might have effect on students' performance.

### 9.8.1 Medium of Instruction (MOI)

This analysis was only conducted in secondary schools as there were two types of MOI in secondary schools.

#### *9.8.1.1 Science*

When examining the medium of instruction and the students' performance in Science PA, the students using Chinese Language as the medium of instruction (CMI) (Table 9.73) outperformed the students using English as the medium of instruction (EMI) in the dimensions of "define", "access", "communicate" and "evaluate" as well as in the "total" score and the mean scores differences between students of CMI schools and EMI schools were found to be statistically significant by ANOVA. On the other hand, vice versa results were found in the dimensions of "manage", "integrate" and "create". However, there were no statistically significances found in these three dimensions.

*Table 9.73 Mean scores of 8 IL indicators in Science PA at secondary schools with regard to Medium of instruction*

| MOI / Science IL Indicators | CMI | | EMI | | F | Sig. |
|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | | |
| **Define** | 3.15 | (1.85) | 2.71 | (1.89) | 11.57 | 0.00* |
| **Access** | 2.45 | (1.86) | 2.04 | (1.93) | 9.74 | 0.00* |
| **Manage** | 1.73 | (1.67) | 1.76 | (1.68) | 0.07 | 0.79 |
| **Integrate** | 2.08 | (2.76) | 2.12 | (2.82) | 0.03 | 0.86 |
| **Create** | 0.44 | (0.60) | 0.45 | (0.85) | 0.03 | 0.87 |
| **Communicate** | 0.82 | (0.81) | 0.69 | (0.81) | 5.98 | 0.02* |
| **Evaluate** | 0.64 | (1.17) | 0.27 | (0.81) | 26.55 | 0.00* |
| **Total** | 11.32 | (6.14) | 10.04 | (5.69) | 9.69 | 0.00* |
| N | 467 | | 378 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

#### *9.8.1.2 Technical*

For the examination of the medium of instruction and the secondary school students' performance in Technical PA, results were found statistically significant (Table 9.74) in the dimensions of "define" and "evaluate" as well as in the "total" score. It was found that students of EMI schools had significantly higher mean scores than students of CMI schools in the dimensions of "define", "evaluate" as well as in the "total" score.

*Table 9.74 Mean scores of 8 IL indicators in Technical PA at secondary schools with regard to Medium of instruction*

| MOI / Technical IL Indicators | CMI | | EMI | | F | Sig. |
|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | | |
| **Define** | 1.94 | (1.20) | 2.11 | (1.14) | 4.04 | 0.04* |
| **Access** | 7.85 | (1.56) | 7.99 | (1.59) | 1.54 | 0.22 |
| **Manage** | 4.76 | (1.93) | 4.55 | (2.09) | 2.33 | 0.13 |
| **Integrate** | 1.73 | (1.57) | 1.77 | (1.51) | 0.16 | 0.69 |
| **Create** | 0.46 | (0.73) | 0.56 | (0.77) | 3.28 | 0.07 |
| **Communicate** | 0.29 | (0.58) | 0.28 | (0.59) | 0.02 | 0.88 |
| **Evaluate** | 5.51 | (2.52) | 6.22 | (2.50) | 16.25 | 0.00* |
| **Total** | 22.55 | (6.71) | 23.48 | (6.68) | 3.93 | 0.05* |
| N | 454 | | 369 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

#### *9.8.1.3 Chinese Language*

There were 460 secondary school students of CMI schools and 360 secondary school students of EMI schools participated in the Chinese Language PA. The results showed that students of EMI schools performed better in the 7 IL dimensions and the "total" score. The result of ANOVA showed that except for the "define" dimension, differences in students' performance in the other 6 IL dimensions and the "total" score were statistically significant. This reflected that students of EMI schools performed better than students of CMI schools in the other 6 IL dimensions and the "total" score.

*Table 9.75 Mean scores of 8 IL indicators in Chinese Language PA at secondary schools with regard to Medium of instruction*

| MOI / Chinese Language IL Indicators | CMI | | EMI | | F | Sig. |
|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | | |
| **Define** | 1.09 | (0.77) | 1.19 | (0.72) | 3.70 | 0.06 |
| **Access** | 5.99 | (3.05) | 8.14 | (2.93) | 104.48 | 0.00* |
| **Manage** | 5.04 | (2.66) | 6.25 | (2.60) | 42.22 | 0.00* |
| **Integrate** | 3.12 | (2.47) | 4.04 | (2.60) | 26.53 | 0.00* |
| **Create** | 2.63 | (1.41) | 2.86 | (1.31) | 5.55 | 0.02* |
| **Communicate** | 1.90 | (1.31) | 2.68 | (1.63) | 56.23 | 0.00* |
| **Evaluate** | 2.04 | (1.69) | 2.82 | (1.75) | 41.52 | 0.00* |
| **Total** | 21.83 | (8.96) | 27.98 | (9.26) | 92.33 | 0.00* |
| N | 460 | | 360 | | | |

N.B. - The statistical test employed is one-way ANOVA.

- Difference significant if Sig.(p)<0.05.

### 9.8.2 Ability Grouping

This analysis was conducted in both primary and secondary schools. There were four ability groupings for the primary school students (high, middle, low and unclassified) while three for the secondary school students (high, middle and low).

#### *9.8.2.1 Science*

As shown in Table 9.76, students of "middle" ability outperformed the others in the dimensions of "define", "access", "manage", "communicate" and "evaluate" as well as the "total" score. With the exception in the "evaluate" dimension, all the other results were proved to be statistically significant by ANOVA. Students of "high" ability scored significantly higher than the others in the "integrate" dimension. Appendix 9.21 indicated the differences between groups which were statistically significant. In the dimensions of "manage", "create" and "integrate", the mean scores of students of "low" ability were significantly different from those of "high" ability and "middle" ability. The mean scores of students of "high" ability were significantly lower than those of "middle" ability in the "define" and "communicate" dimensions.

*Table 9.76 Mean scores of 8 IL indicators in Science PA at secondary schools with regard to ability grouping*

| Science IL Indicators \ Ability Grouping | **High** | | **Middle** | | **Low** | | **F** | **Sig.** |
|---|---|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | Mean | (SD) | | |
| **Define** | 2.79 | (1.89) | 3.23 | (1.84) | 2.78 | (1.87) | 5.37 | 0.00* |
| **Access** | 2.15 | (1.90) | 2.54 | (1.91) | 1.95 | (1.82) | 5.45 | 0.00* |
| **Manage** | 1.86 | (1.74) | 1.88 | (1.65) | 0.78 | (0.90) | 17.79 | 0.00* |
| **Integrate** | 2.35 | (3.02) | 2.00 | (2.55) | 1.21 | (2.05) | 6.75 | 0.00* |
| **Create** | 0.48 | (0.83) | 0.48 | (0.56) | 0.16 | (0.48) | 7.77 | 0.00* |
| **Communicate** | 0.71 | (0.80) | 0.87 | (0.82) | 0.67 | (0.79) | 4.17 | 0.02* |
| **Evaluate** | 0.42 | (1.01) | 0.57 | (1.08) | 0.43 | (1.06) | 2.18 | 0.11 |
| **Total** | 10.75 | (6.17) | 11.56 | (5.67) | 7.98 | (5.15) | 12.98 | 0.00* |
| N | 447 | | 301 | | 97 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### *9.8.2.2 Technical*

For primary school students (Table 9.77), the "unclassified" group of students performed significantly better with respect to all the 8 IL indicators except "communicate". For the Post-hoc tests (Appendix 9.22), the differences between the "unclassified" group and each of the three groups were significant in the dimensions of "define", "evaluate" as well as the "total" score. The difference between the "unclassified" group and the "middle" as well as "low" ability groups were significant in the dimensions of "manage", "integrate" and "create". Besides, the mean score of the "high" ability group was found to differ significantly from that of the "middle" ability group and also from the "low" ability group in the dimensions of "manage", "integrate" , "create" and "evaluate", as well as the "total" score.

*Table 9.77 Mean scores of 8 IL indicators in Technical PA at primary schools with regard to ability grouping*

| Technical IL Indicators \ Ability Grouping | High | | Middle | | Low | | Unclassified | | F | Sig. |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | Mean | (SD) | Mean | (SD) | | |
| **Define** | 1.19 | (1.26) | 1.01 | (1.22) | 1.09 | (1.20) | 2.05 | (1.18) | 4.71 | 0.00* |
| **Access** | 7.16 | (2.07) | 6.76 | (2.27) | 6.65 | (2.55) | 7.84 | (1.38) | 3.76 | 0.01* |
| **Manage** | 2.92 | (2.00) | 2.21 | (1.86) | 2.31 | (1.91) | 3.79 | (2.12) | 10.60 | 0.00* |
| **Integrate** | 0.83 | (1.22) | 0.46 | (0.87) | 0.48 | (0.98) | 1.13 | (1.49) | 9.06 | 0.00* |
| **Create** | 0.30 | (0.56) | 0.18 | (0.46) | 0.14 | (0.41) | 0.58 | (0.61) | 8.344 | 0.00* |
| **Communicate** | 0.09 | (0.35) | 0.11 | (0.38) | 0.08 | (0.31) | 0.05 | (0.23) | 0.47 | 0.70 |
| **Evaluate** | 3.41 | (2.09) | 2.75 | (1.72) | 2.75 | (1.81) | 4.74 | (2.13) | 12.78 | 0.00* |
| **Total** | 15.89 | (6.44) | 13.48 | (5.70) | 13.50 | (6.46) | 20.18 | (5.64) | 15.09 | 0.00* |
| N | 328 | | 277 | | 206 | | 19 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

For secondary school students, they were classified into three groups, namely “high”, “middle” and “low”. From Table 9.78, ANOVA showed statistically significant differences in the mean scores were found amongst the three student groups for all IL indicators, except “communicate”.

For the Post-hoc tests (Appendix 9.23) showed that the differences between the mean scores of students of “high” ability group and each of the other two groups were significant in “define”, “create” and “evaluate”, as well as the “total” score. For the dimensions of “access”, “manage” and “integrate”, it was found that the mean differences between the “low” ability group of students and the “high” ability group were significant. The mean differences between the “middle” ability group and the “low” ability group were also significant in these three dimensions.

*Table 9.78 Mean scores of 8 IL indicators in Technical PA at secondary schools with regard to ability grouping*

| Technical IL Indicators \ Ability Grouping | High | | Middle | | Low | | F | Sig. |
|---|---|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | Mean | (SD) | | |
| **Define** | 2.15 | (1.12) | 1.93 | (1.20) | 1.65 | (1.28) | 7.71 | 0.00* |
| **Access** | 8.04 | (1.52) | 7.89 | (1.48) | 7.38 | (2.03) | 6.40 | 0.00* |
| **Manage** | 4.80 | (2.07) | 4.80 | (1.81) | 3.52 | (1.98) | 16.02 | 0.00* |
| **Integrate** | 1.93 | (1.56) | 1.70 | (1.54) | 1.02 | (1.20) | 13.10 | 0.00* |
| **Create** | 0.60 | (0.80) | 0.47 | (0.72) | 0.12 | (0.32) | 15.71 | 0.00* |
| **Communicate** | 0.31 | (0.62) | 0.28 | (0.56) | 0.20 | (0.46) | 1.42 | 0.24 |
| **Evaluate** | 6.33 | (2.48) | 5.36 | (2.48) | 4.88 | (2.45) | 20.73 | 0.00* |
| **Total** | 24.16 | (6.64) | 22.42 | (6.31) | 18.76 | (6.61) | 26.06 | 0.00* |
| N | 438 | | 300 | | 85 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

#### *9.8.2.3 Mathematics*

When examining ability grouping and the primary school students' performance in Mathematics PA, the results were found to be as expected. Students of "high" ability grouping achieved most outstandingly (Table 9.79). However, some unexpected phenomena were noted. Firstly, the performance of students of "low" ability grouping not only was very close to that of the students of the "middle" ability grouping, but also scored higher than those of the latter in some dimensions, such as "define", "access", "integrate", "create" and "evaluate" as well as in the "total" score. When the SD was considered, the gaps among individual students of "low" ability grouping were narrower than those of "middle" and "high" ability groupings. In other words, students of "high" ability grouping displayed wider gaps in their performances.

*Table 9.79 Mean scores of 8 IL indicators in Mathematics PA at primary schools with regard to ability grouping*

| Mathematics IL Indicators \ Ability Grouping | High Mean (SD) | Middle Mean (SD) | Low Mean (SD) | Unclassified Mean (SD) | F | Sig. |
|---|---|---|---|---|---|---|
| **Define** | 1.92 (0.94) | 1.64 (1.12) | 1.85 (1.00) | 1.82 (0.81) | 4.07 | 0.01* |
| **Access** | 4.61 (2.12) | 3.67 (2.24) | 4.14 (2.04) | 5.18 (1.63) | 11.08 | 0.00* |
| **Manage** | 3.74 (2.22) | 3.35 (2.13) | 2.46 (2.37) | 3.18 (2.79) | 14.04 | 0.00* |
| **Integrate** | 2.78 (2.07) | 1.75 (1.67) | 2.34 (1.83) | 2.94 (2.11) | 15.86 | 0.00* |
| **Create** | 4.53 (2.86) | 3.83 (2.84) | 4.10 (3.08) | 4.06 (2.84) | 3.03 | 0.03* |
| **Communicate** | 0.99 (1.03) | 0.77 (0.89) | 0.45 (0.83) | 0.88 (1.17) | 14.17 | 0.00* |
| **Evaluate** | 0.26 (0.77) | 0.08 (0.49) | 0.12 (0.53) | 0.12 (0.49) | 4.61 | 0.00* |
| **Total** | 18.82 (7.93) | 15.10 (7.60) | 15.46 (7.52) | 18.18 (7.19) | 14.56 | 0.00* |
| N | 337 | 283 | 207 | 17 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

Secondly, the gaps among the "unclassified" ability grouping of students were narrower in dimensions of "define" and "access" as well as the "total" score (SDs were 0.81, 1.63 and 7.19 respectively). They also shared the smallest SD with the "middle" ability grouping of students in dimensions of "create" and "evaluate" (2.84 and 0.49 respectively) (Table 9.79). These students also got higher minimum scores in "access" (2.00) and the "total" score (6.00) than students of the other three groupings (Appendix 9.24). Thirdly, despite the outstanding performance of "high" ability students, students of "middle" ability grouping achieved the highest maximum total score (38). At the same time, the maximum total score that a student from "low" ability grouping achieved was just 1 mark (35) lower than that of students of the "high" ability grouping (36). Results of the Post-hoc tests (Appendix 9.25) further supported the better performance of "high" ability grouping students than that of the "middle" ability students in nearly all dimensions except in "manage". However, the results also showed that performance of "high" ability students was not necessarily better than that of students of "low" and "unclassified" ability groupings in dimensions such as "define", "access", "create" and "evaluate".

### *9.8.2.4 Chinese Language*

**Primary school**

The abilities of primary school students were categorized into 4 groups, namely "high", "middle", "low" and "unclassified". Students of the "high" ability grouping performed the best in "define" and "evaluate" while students in the "unclassified" group performed the best in "integrate", "access", "manage", "communicate", "create" and "total" score. The result of ANOVA showed there were significant differences in all IL indicators. This reflected that there were differences in students' performance among the groups in all IL indicators. Post-hoc tests (Appendix 9.26) showed that there were significant differences among 1 to 3 different ability groupings in all 8 IL indicators. For example, there were significant differences between the performance of the "high" ability grouping students and "middle" ability grouping students with the former having better performance in all the 7 IL dimensions and the "total" score.

*Table 9.80 Mean scores of 8 IL indicators in Chinese Language PA at primary schools with regard to ability grouping*

| **Ability Grouping** / **Chinese Language IL Indicators** | **High** | | **Middle** | | **Low** | | **Unclassified** | | **F** | **Sig.** |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean(SD) | | Mean(SD) | | Mean(SD) | | Mean(SD) | | | |
| **Define** | 1.55 | (0.89) | 1.26 | (0.99) | 1.37 | (0.95) | 1.50 | (0.99) | 4.93 | 0.00* |
| **Access** | 5.21 | (3.86) | 3.68 | (3.26) | 4.55 | (3.94) | 5.50 | (4.12) | 8.87 | 0.00* |
| **Manage** | 2.56 | (1.89) | 2.00 | (1.66) | 2.13 | (1.73) | 2.72 | (2.40) | 5.68 | 0.00* |
| **Integrate** | 3.13 | (2.07) | 2.16 | (1.85) | 2.46 | (2.14) | 3.56 | (2.31) | 13.43 | 0.00* |
| **Create** | 2.99 | (2.22) | 2.29 | (1.89) | 2.51 | (2.10) | 3.33 | (2.61) | 6.60 | 0.00* |
| **Communicate** | 2.76 | (1.64) | 2.13 | (1.34) | 2.33 | (1.69) | 3.11 | (2.03) | 9.64 | 0.00* |
| **Evaluate** | 2.47 | (2.40) | 1.71 | (2.14) | 1.98 | (2.19) | 2.17 | (2.18) | 5.94 | 0.00* |
| **Total** | 20.66 | (10.21) | 15.21 | (8.56) | 17.33 | (10.57) | 21.89 | (12.06) | 18.64 | 0.00* |
| N | 335 | | 270 | | 202 | | 18 | | | |

(N=825)

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### Secondary school

The abilities of secondary school students were categorized into three groups, namely "high", "middle" and "low". Students of the "high" ability grouping performed the best in all IL dimensions. The result of the ANOVA showed that except for "define", the differences in students' performance were statistically significant in the other 7 IL indicators. The result of the Post-hoc tests (Appendix 9.27) showed that there were statistically significant differences in students' performance among different ability groupings in the IL dimensions of "access", "manage", "integrate", "create" and "communicate" as well as the "total" score. For "evaluate", significant differences were found between students of the "high" and "middle" ability groupings, and between students in the "high" and "low" ability groupings.

*Table 9.81 Mean scores of 8 IL indicators in Chinese Language PA at secondary schools with regard to ability grouping*

| Chinese Language IL Indicators \ Ability Grouping | **High** | | **Middle** | | **Low** | | **F** | **Sig.** |
|---|---|---|---|---|---|---|---|---|
| | Mean(SD) | | Mean(SD) | | Mean(SD) | | | |
| **Define** | 1.19 | (0.72) | 1.09 | (0.75) | 1.04 | (0.82) | 2.46 | 0.09 |
| **Access** | 8.06 | (2.89) | 6.07 | (2.96) | 4.53 | (2.93) | 76.01 | 0.00* |
| **Manage** | 6.34 | (2.55) | 5.04 | (2.47) | 3.70 | (2.78) | 50.42 | 0.00* |
| **Integrate** | 4.21 | (2.58) | 3.12 | (2.33) | 1.67 | (2.06) | 47.33 | 0.00* |
| **Create** | 2.96 | (1.35) | 2.71 | (1.26) | 1.76 | (1.40) | 30.98 | 0.00* |
| **Communicate** | 2.67 | (1.61) | 1.92 | (1.27) | 1.32 | (0.99) | 45.16 | 0.00* |
| **Evaluate** | 2.85 | (1.73) | 1.97 | (1.66) | 1.53 | (1.57) | 37.0 | 0.00* |
| **Total** | 28.27 | (9.02) | 21.92 | (8.16) | 15.55 | (7.61) | 104.86 | 0.00* |
| N | 428 | | 301 | | 91 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### 9.8.3 School Location

This analysis was conducted in both primary and secondary schools.

#### *9.8.3.1 Science*

With regard to the location of schools, it was found that students of schools in the New Territories (NT) had higher means in the dimensions of “define”, “access” and “manage” as well as the “total” score and the result of ANOVA showed that they were statistically significant. Besides, they also had higher scores in the “create” and “evaluate” dimensions but the results were not statistically significant.

Students of schools in the Kowloon (KLN) outperformed the others in the dimensions of “communicate” and “integrate”, but the results were found to be not statistically significant by ANOVA.

*Table 9.82 Mean scores of 8 IL indicators in Science PA at secondary schools with regard to school locations*

| Science IL Indicators \ School Locations | HK Mean (SD) | KLN Mean (SD) | NT Mean (SD) | F | Sig. |
|---|---|---|---|---|---|
| **Define** | 2.80 (1.92) | 2.77 (1.83) | 3.14 (1.87) | 3.93 | 0.02* |
| **Access** | 1.96 (1.83) | 2.14 (2.04) | 2.52 (1.82) | 6.92 | 0.00* |
| **Manage** | 1.54 (1.59) | 1.70 (1.66) | 1.88 (1.71) | 2.99 | 0.05* |
| **Integrate** | 2.14 (2.78) | 2.21 (2.86) | 2.01 (2.75) | 0.45 | 0.64 |
| **Create** | 0.42 (0.74) | 0.41 (0.77) | 0.47 (0.67) | 0.56 | 0.57 |
| **Communicate** | 0.72 (0.74) | 0.78 (0.84) | 0.77 (0.83) | 0.39 | 0.68 |
| **Evaluate** | 0.41 (0.95) | 0.47 (1.04) | 0.51 (1.09) | 0.70 | 0.50 |
| **Total** | 9.99 (5.59) | 10.49 (6.15) | 11.31 (6.02) | 3.67 | 0.03* |
| N | 210 | 244 | 391 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

Post-hoc tests (Appendix 9.28) showed that in the “define” and “access” dimensions, the mean differences between students of schools in NT and those of schools in KLN were statistically significant. In the indicators of “access”, “manage” and the “total” score, the mean differences between students of schools in the NT and those of the schools in Hong Kong Island (HK) were statistically significant.

### *9.8.3.2 Technical*

For primary school students, with regard to the location of schools, it was found that students of schools in the NT had higher mean scores in most dimensions, except for the dimensions of “define” and “access”. Students of schools in KLN had the highest mean scores in the dimension of “access” and those of schools in HK had the highest mean scores in the dimension of “define”. However, no result for any dimension was found to be statistically significant as shown in Table 9.83.

*Table 9.83 Mean scores of 8 IL indicators in Technical PA at primary schools with regard to school locations*

| Technical IL Indicators \ School Locations | HK Mean(SD) | KLN Mean(SD) | NT Mean(SD) | F | Sig. |
|---|---|---|---|---|---|
| **Define** | 1.17 (1.21) | 1.15 (1.24) | 1.10 (1.25) | 0.23 | 0.80 |
| **Access** | 6.83 (2.57) | 6.93 (2.19) | 6.92 (2.26) | 0.06 | 0.94 |
| **Manage** | 2.27 (2.06) | 2.50 (2.01) | 2.62 (1.93) | 1.14 | 0.32 |
| **Integrate** | 0.41 (0.75) | 0.58 (1.10) | 0.68 (1.10) | 2.20 | 0.11 |
| **Create** | 0.19 (0.43) | 0.22 (0.53) | 0.23 (0.50) | 0.26 | 0.77 |
| **Communicate** | 0.04 (0.27) | 0.10 (0.33) | 0.10 (0.36) | 0.77 | 0.47 |
| **Evaluate** | 2.64 (1.85) | 2.99 (1.89) | 3.15 (1.98) | 2.33 | 0.10 |
| **Total** | 13.55 (6.41) | 14.47 (6.38) | 14.80 (6.31) | 1.25 | 0.29 |
| N | 69 | 272 | 489 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

For secondary school students, with regard to the location of schools, it was found that students of schools in the NT performed better in many dimensions. They had higher mean scores in the indicators of “integrate”, “create”, “communicate”, “manage” and the “total” score. Students of schools in KLN had higher mean scores in the “define” and “evaluate” dimensions. For students of schools in HK, highest mean score was found in the dimension of “access” only. However, only mean score differences in the dimension of “manage” for students in different school locations were found to be statistically significant.

For the Post-hoc tests (Appendix 9.29) between school locations and mean scores of the 8 IL indicators, it was found that students of schools in NT had significantly higher mean scores than those of schools in KLN in the dimension of “manage”.

*Table 9.84 Mean scores of 8 IL indicators in Technical PA at secondary schools with regard to school locations*

| Technical IL Indicators \ School Locations | HK Mean(SD) | KLN Mean(SD) | NT Mean(SD) | F | Sig. |
|---|---|---|---|---|---|
| **Define** | 1.92 (1.18) | 2.14 (1.17) | 1.99 (1.18) | 2.27 | 0.10 |
| **Access** | 8.00 (1.50) | 7.97 (1.47) | 7.83 (1.67) | 0.92 | 0.40 |
| **Manage** | 4.51 (1.98) | 4.48 (2.12) | 4.87 (1.93) | 3.69 | 0.03* |
| **Integrate** | 1.64 (1.45) | 1.67 (1.64) | 1.86 (1.52) | 1.77 | 0.17 |
| **Create** | 0.51 (0.71) | 0.46 (0.78) | 0.52 (0.75) | 0.50 | 0.60 |
| **Communicate** | 0.27 (0.55) | 0.24 (0.55) | 0.33 (0.62) | 2.03 | 0.13 |
| **Evaluate** | 5.87 (2.39) | 6.02 (2.72) | 5.68 (2.49) | 1.39 | 0.25 |
| **Total** | 22.71 (6.22) | 22.99 (6.99) | 23.09 (6.80) | 0.21 | 0.81 |
| N | 201 | 244 | 378 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### *9.8.3.3 Mathematics*

Table 9.85 shows the mean scores of 8 IL indicators in Mathematics PA with respect to school locations. Students of schools in the Hong Kong Island (HK) outperformed the others in “define”, “access”, “integrate” and the “total” score. Students of schools in Kowloon performed better in “manage”, “communicate” and “evaluate” whereas students of schools in NT outperformed the others in “create”. When considering individual students’ performances, it was interesting to note that students of schools in the NT had highest maximum score in the indicators of “integrate” and “total” score (Appendix 9.30). Results from ANOVA indicated that the differences in the mean scores of students in different school locations were found to be statistically significant only in the dimensions of “integrate” and “communicate”. Post-hoc tests (Appendix 9.31) showed that in the “access” dimension, the mean differences between students of schools in HK and those of schools in NT were statistically significant. In the “integrate” and “communicate” dimensions, the mean difference between students of schools in HK and those of schools in NT and KLN were also statistically significant.

*Table 9.85 Mean scores of 8 IL indicators in Mathematics PA at primary schools with regard to school locations*

| School Locations / Mathematics IL Indicators | HK Mean (SD) | KLN Mean (SD) | NT Mean (SD) | F | Sig. |
|---|---|---|---|---|---|
| **Define** | 1.92 (0.88) | 1.82 (1.03) | 1.78 (1.04) | 0.64 | 0.53 |
| **Access** | 4.80 (1.82) | 4.14 (2.25) | 4.14 (2.16) | 2.86 | 0.06 |
| **Manage** | 2.68 (2.46) | 3.39 (2.28) | 3.30 (2.26) | 2.62 | 0.07 |
| **Integrate** | 3.00 (2.11) | 2.31 (1.96) | 2.26 (1.89) | 4.36 | 0.01* |
| **Create** | 4.09 (3.24) | 4.17 (2.85) | 4.19 (2.93) | 0.03 | 0.97 |
| **Communicate** | 0.41 (0.80) | 0.85 (0.93) | 0.80 (0.99) | 5.82 | 0.00* |
| **Evaluate** | 0.17 (0.48) | 0.22 (0.74) | 0.14 (0.57) | 1.48 | 0.23 |
| **Total** | 17.08 (8.70) | 16.91 (8.01) | 16.59 (7.73) | 0.21 | 0.81 |
| N | 66 | 277 | 501 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### *9.8.3.4 Chinese Language*

**Primary Chinese Language**

There were a total of 825 students participated in the primary 5 Chinese Language PA. Among these students, 63 students studied in schools located on HK Island, 263 students were from schools located in KLN and 499 students were from schools located in the NT. The results showed that students who studied in schools located on HK Island performed better in the IL dimensions of “define”, “access”, “manage” and “communicate”. Students studying in schools located in the NT performed the best in “integrate”, “create”, “evaluate” and the “total” score. Students studying in schools located in KLN performed the best in “evaluate”. The result of ANOVA showed that there were no significant differences in the performance of students studying in schools of different locations. This implied the geographical locations of the schools did not affect students’ performances in all IL dimensions.

*Table 9.86 Mean scores of 8 IL indicators in Chinese Language PA at primary schools with regard to school locations*

| Chinese Language IL Indicators \ School Locations | HK<br>Mean (SD) | KLN<br>Mean (SD) | NT<br>Mean (SD) | F | Sig. |
|---|---|---|---|---|---|
| **Define** | 1.49 (0.97) | 1.44 (0.97) | 1.38 (0.94) | 0.67 | 0.51 |
| **Access** | 4.83 (3.96) | 4.30 (3.83) | 4.65 (3.68) | 0.92 | 0.40 |
| **Manage** | 2.46 (1.84) | 2.17 (1.83) | 2.30 (1.79) | 0.87 | 0.42 |
| **Integrate** | 2.52 (2.24) | 2.67 (2.10) | 2.66 (2.03) | 0.14 | 0.87 |
| **Create** | 2.59 (1.98) | 2.51 (2.15) | 2.74 (2.11) | 1.03 | 0.36 |
| **Communicate** | 2.56 (1.99) | 2.44 (1.58) | 2.45 (1.55) | 0.13 | 0.88 |
| **Evaluate** | 1.60 (2.17) | 2.10 (2.29) | 2.10 (2.30) | 1.71 | 0.18 |
| **Total** | 18.05 (10.80) | 17.73 (10.54) | 18.29 (9.80) | 0.26 | 0.77 |
| N | 63 | 263 | 499 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### Secondary Chinese Language

There were a total of 820 students participated in the secondary 2 Chinese Language PA. Among these students, 204 of them studied in the schools located on HK Island, 237 students studied in schools located in KLN and 379 students studied in the schools located in the NT. The results showed that students studying in the NT performed the best in “create”. Students studying in schools located on HK Island performed the best in other dimensions and the “total” score. In the dimensions of “define”, “access” and “evaluate” as well as the “total” score. The result of ANOVA showed that there were statistically significant differences in the performance of students studying in different locations. The Post-hoc tests (Appendix 9.32) showed that for “define”, “access” and the “total” score, students studying in schools located on HK Island performed better than students studying in KLN and the NT. For the “evaluate” dimension, students studying in schools located on HK Island performed better than students studying in the NT. For “manage”, students studying in schools located on HK Island performed better than students studying in KLN.

*Table 9.87 Mean scores of 8 IL indicators in Chinese Language PA at secondary schools with regard to school locations*

| School Locations / Chinese Language IL Indicators | HK Mean (SD) | KLN Mean (SD) | NT Mean (SD) | F | Sig. |
|---|---|---|---|---|---|
| **Define** | 1.29 (0.72) | 1.09 (0.77) | 1.08 (0.74) | 6.02 | 0.00* |
| **Access** | 7.81 (3.02) | 6.80 (3.12) | 6.55 (3.21) | 10.92 | 0.00* |
| **Manage** | 5.93 (2.61) | 5.32 (2.78) | 5.53 (2.68) | 2.88 | 0.06 |
| **Integrate** | 3.62 (2.59) | 3.42 (2.60) | 3.54 (2.54) | 0.33 | 0.72 |
| **Create** | 2.67 (1.36) | 2.73 (1.41) | 2.78 (1.35) | 0.43 | 0.65 |
| **Communicate** | 2.32 (1.55) | 2.11 (1.57) | 2.29 (1.44) | 1.42 | 0.24 |
| **Evaluate** | 2.72 (1.71) | 2.45 (1.78) | 2.16 (1.74) | 7.12 | 0.00* |
| **Total** | 26.36 (9.43) | 23.92 (9.95) | 23.92 (9.34) | 5.02 | 0.00* |
| N | 204 | 237 | 379 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### 9.8.4 School Sex

This analysis was only conducted in secondary schools as all the primary schools in our sample were "co-educational" schools.

#### *9.8.4.1 Science*

With regard to school sex and students' performance in Science PA, it was found that students of boys' schools significantly outperformed the others in the dimensions of "define", "integrate" as well as the "total" score. Besides, the highest mean score in the dimension of "evaluate" was also found in the boys' schools but the result was not statistically significant. Co-educational schools had higher mean scores in the dimensions of "access" and "manage" but the result was significant in the dimension of "manage" only. Girls' schools had the highest mean scores in the area of "create" but the result was not significant.

*Table 9.88 Mean scores of 8 IL indicators in Science PA at secondary schools with regard to school sex*

| School Sex / Science IL Indicators | Co-educational | | Boys' schools | | Girls' schools | | F | Sig. |
|---|---|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | Mean | (SD) | | |
| **Define** | 2.86 | (1.84) | 3.42 | (1.97) | 2.91 | (1.92) | 4.72 | 0.01* |
| **Access** | 2.29 | (1.91) | 2.22 | (1.67) | 2.20 | (2.15) | 0.15 | 0.86 |
| **Manage** | 1.82 | (1.74) | 1.68 | (1.59) | 1.39 | (1.31) | 3.07 | 0.05* |
| **Integrate** | 2.09 | (2.78) | 2.82 | (2.92) | 1.24 | (2.40) | 9.37 | 0.00* |
| **Create** | 0.44 | (0.67) | 0.41 | (0.69) | 0.50 | (0.99) | 0.47 | 0.62 |
| **Communicate** | 0.80 | (0.83) | 0.80 | (0.67) | 0.49 | (0.82) | 6.66 | 0.00* |
| **Evaluate** | 0.49 | (1.04) | 0.54 | (1.08) | 0.33 | (0.97) | 1.36 | 0.26 |
| **Total** | 10.79 | (6.10) | 11.88 | (5.27) | 9.07 | (5.69) | 6.51 | 0.00* |
| N | 614 | | 127 | | 104 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

Post-hoc tests (Appendix 9.33) indicated that in the "define" dimension, the differences between boys' schools and co-educational schools were statistically significant. In the "manage" dimension, the differences between girls' school and co-educational schools were statistically significant. In the "integrate" dimension, the differences among the three school sex groups were also statistically significant. In the "communicate" dimension and the "total" score, there were statistically significant differences between students' scores in girls' schools and boys' schools as well as students' scores in girls' schools and co-ed schools.

### *9.8.4.2 Technical*

For secondary school students, with regard to school sex, it was found that girls' or co-educational school students performed better in most dimensions, except in the dimension of "define". Girls' school students had higher mean scores in the dimensions of "access", "create" and "evaluate" as well as the "total" score. Co-educational school students had higher mean scores in the dimensions of "integrate", "communicate" and "manage". For students in the boys' schools, only the dimension of "define" was with the highest mean score. Statistically significant results were found in the dimensions of "define", "evaluate" and "manage"

For the Post-hoc tests (Appendix 9.34) between school sex and mean scores of 8 IL indicators. For "evaluate", it was found that girls' school students had significantly higher mean scores than those in boys' and co-educational schools. For "manage", it was also found that girls' school students had significantly lower mean scores than those of co-educational and boys schools.

*Table 9.89 Mean scores of 8 IL indicators in Technical PA at secondary schools with regard to school sex*

| School Sex / Science IL Indicators | Co-educational schools Mean(SD) | Boys' schools Mean(SD) | Girls' schools Mean(SD) | F | Sig. |
|---|---|---|---|---|---|
| **Define** | 1.95 (1.20) | 2.25 (1.11) | 2.10 (1.10) | 3.54 | 0.03* |
| **Access** | 7.88 (1.60) | 7.96 (1.59) | 8.08 (1.39) | 0.77 | 0.46 |
| **Manage** | 4.83 (1.93) | 4.30 (1.94) | 4.15 (2.35) | 7.63 | 0.00* |
| **Integrate** | 1.79 (1.54) | 1.58 (1.45) | 1.72 (1.66) | 0.96 | 0.38 |
| **Create** | 0.53 (0.75) | 0.36 (0.66) | 0.54 (0.84) | 2.66 | 0.07 |
| **Communicate** | 0.31 (0.61) | 0.29 (0.52) | 0.19 (0.52) | 1.80 | 0.17 |
| **Evaluate** | 5.68 (2.59) | 5.61 (2.29) | 6.91 (2.24) | 11.28 | 0.00* |
| **Total** | 22.96 (6.82) | 22.34 (5.90) | 23.68 (6.94) | 1.11 | 0.33 |
| N | 599 | 118 | 106 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### *9.8.4.3 Chinese Language*

**Secondary Chinese Language**

Among the students who had taken part in the Secondary 2 Chinese Language PA, 598 students studied in co-educational schools, 122 students studied in boys' schools and 100 students studied in girls' school. The results showed that students from boys' schools performed better in "define", "access", "communicate" and "evaluate" while students from co-educational schools performed better in the other IL dimensions. The result of ANOVA showed that there were statistically significant differences in the performance of students studying in the three types of schools in "define", "access", "communicate" and "evaluate". The Post-hoc tests (Appendix 9.35) showed that the difference in students' performance in the "communicate" dimension were not statistically significant. For "define", students of boys' schools performed better than those of girls' schools. For "access" and "evaluate", students of boys' schools performed better than students of girls' and co-educational schools.

*Table 9.90 Mean scores of 8 IL indicators in Chinese Language PA at secondary schools with regard to school sex*

| School Sex / Chinese Language IL Indicators | Co-educational schools Mean(SD) | Boys' schools Mean(SD) | Girls' schools Mean(SD) | F | Sig. |
|---|---|---|---|---|---|
| **Define** | 1.13 (0.75) | 1.29 (0.70) | 0.98 (0.78) | 4.71 | 0.00* |
| **Access** | 6.79 (3.14) | 7.80 (3.22) | 6.76 (3.21) | 5.29 | 0.01* |
| **Manage** | 5.60 (2.69) | 5.48 (2.59) | 5.52 (2.90) | 0.13 | 0.88 |
| **Integrate** | 3.61 (2.50) | 3.48 (2.59) | 3.09 (2.90) | 1.76 | 0.17 |
| **Create** | 2.81 (1.33) | 2.54 (1.39) | 2.53 (1.51) | 3.20 | 0.62 |
| **Communicate** | 2.23 (1.45) | 2.36 (1.53) | 2.18 (1.79) | 0.48 | 0.04* |
| **Evaluate** | 2.30 (1.74) | 2.93 (1.71) | 2.17 (1.82) | 7.28 | 0.00* |
| **Total** | 24.47 (9.41) | 25.86 (8.78) | 23.23 (11.33) | 2.11 | 0.12 |
| N | 598 | 122 | 100 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### 9.8.5 Operational Session

This analysis was only conducted in primary schools. There were 3 types of operational sessions, namely AM, PM and whole day (WD).

#### *9.8.5.1 Technical*

Students studying in AM schools significantly outperformed in the "access" and "manage" dimensions. For the Post-hoc tests (Appendix 9.36) between operational sessions and the mean scores of the 8 indicators of IL, it was found that students of the AM schools had significantly higher mean scores than those WD school students in the dimensions of "access" and "manage".

*Table 9.91 Mean scores of 8 IL indicators in Technical PA at primary schools with regard to operational sessions*

| Technical IL Indicators \ Operational Sessions | AM | | PM | | WD | | F | Sig. |
|---|---|---|---|---|---|---|---|---|
| | Mean | (SD) | Mean | (SD) | Mean | (SD) | | |
| **Define** | 1.21 | (1.16) | 1.00 | (1.22) | 1.13 | (1.25) | 0.45 | 0.64 |
| **Access** | 7.58 | (1.43) | 7.22 | (2.02) | 6.83 | (2.34) | 4.10 | 0.02* |
| **Manage** | 3.15 | (1.60) | 2.71 | (2.00) | 2.48 | (1.99) | 4.01 | 0.02* |
| **Integrate** | 0.81 | (0.95) | 0.65 | (1.07) | 0.60 | (1.09) | 1.19 | 0.30 |
| **Create** | 0.30 | (0.52) | 0.22 | (0.50) | 0.22 | (0.50) | 0.80 | 0.45 |
| **Communicate** | 0.07 | (0.35) | 0.07 | (0.26) | 0.10 | (0.35) | 0.28 | 0.76 |
| **Evaluate** | 3.00 | (1.33) | 3.50 | (1.90) | 3.02 | (2.00) | 1.55 | 0.21 |
| **Total** | 16.12 | (4.77) | 15.37 | (6.34) | 14.37 | (6.47) | 2.91 | 0.06 |
| N | 71 | | 55 | | 704 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

### *9.8.5.2 Mathematics*

In Table 9.92, students studying in AM schools outperformed the others in "access", "manage", "integrate", "create", "evaluate" and the "total" score but only the result in "integrate was significant. PM school students performed better in "communicate" but the result was not statistically significant while WD school students performed better in the "define" dimension but the result was also insignificant.

Results from the Post-hoc tests (Table 9.93) indicated that in the "integrate" dimension, the mean score difference between AM and WD schools was significant.

*Table 9.92 Mean scores of 8 IL indicators in Mathematics PA at primary schools with regard to operational sessions*

| Mathematics IL Indicators \ Operational Sessions | AM Mean(SD) | PM Mean(SD) | WD Mean(SD) | F | Sig. |
|---|---|---|---|---|---|
| **Define** | 1.69 (1.00) | 1.74 (1.14) | 1.82 (1.02) | 0.69 | 0.50 |
| **Access** | 4.32 (2.08) | 3.87 (2.44) | 4.20 (2.16) | 0.74 | 0.48 |
| **Manage** | 3.63 (2.48) | 3.24 (2.35) | 3.25 (2.26) | 1.03 | 0.36 |
| **Integrate** | 2.90 (2.17) | 2.22 (2.22) | 2.28 (1.88) | 3.93 | 0.02* |
| **Create** | 4.57 (3.01) | 4.39 (2.82) | 4.12 (2.92) | 1.02 | 0.36 |
| **Communicate** | 0.67 (0.95) | 1.02 (1.04) | 0.78 (0.96) | 2.21 | 0.11 |
| **Evaluate** | 0.21 (0.59) | 0.02 (0.14) | 0.17 (0.65) | 1.71 | 0.18 |
| **Total** | 17.99 (8.16) | 16.50 (9.02) | 16.61 (7.77) | 1.13 | 0.32 |
| N | 81 | 54 | 709 | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

*Table 9.93 Post-hoc tests of 8 IL indicators in Mathematics PA at primary schools with regard to operational sessions*

| Mathematics IL Indicator | Session (1) | Session (2) | Mean Difference between (1) and (2) | Sig. |
|---|---|---|---|---|
| Integrate | AM | WD | .63 | 0.02* |

N.B. - The statistical test employed Tukey's honestly significant difference test.
- Difference significant if Sig. (p)<0.05.

### *9.8.5.3 Chinese Language*

There were a total of 825 primary students taken part in the Chinese Language PA. Among these students, 86 students studied in the AM session, 53 studied in the PM session and 686 students studied in whole day (WD) schools. The results showed that WD school students performed the best in the "access" dimension and students studying in the AM school performed the best in the other 6 IL dimensions. The result of the ANOVA showed that there were statistically significant difference in students' performance in the "define" dimension ($F(2, 827)=3.87$, $p<0.05$). The Post-hoc tests (Table 9.98) showed that in the "define" dimension, students from AM schools performed better than those from WD schools ($p<0.05$).

*Table 9.94 Mean scores of 8 IL indicators in Chinese Language PA at primary schools with regard to operational sessions*

| Chinese Language IL Indicators \ Operational Sessions | AM Mean(SD) | | PM Mean(SD) | | WD Mean(SD) | | F | Sig. |
|---|---|---|---|---|---|---|---|---|
| **Define** | 1.67 | (0.85) | 1.40 | (0.91) | 1.37 | (0.96) | 3.87 | 0.02* |
| **Access** | 4.54 | (3.90) | 3.87 | (3.91) | 4.61 | (3.72) | 0.96 | 0.38 |
| **Manage** | 2.37 | (1.85) | 2.08 | (1.89) | 2.28 | (1.79) | 0.45 | 0.64 |
| **Integrate** | 3.09 | (2.04) | 2.85 | (2.26) | 2.58 | (2.05) | 2.57 | 0.08 |
| **Create** | 2.93 | (2.27) | 2.74 | (2.32) | 2.61 | (2.08) | 0.91 | 0.41 |
| **Communicate** | 2.57 | (1.63) | 2.06 | (1.68) | 2.47 | (1.58) | 1.92 | 0.15 |
| **Evaluate** | 2.54 | (2.44) | 2.30 | (2.49) | 2.02 | (2.24) | 2.16 | 0.12 |
| **Total** | 19.71 | (9.74) | 17.28 | (11.67) | 17.95 | (10.02) | 1.34 | 0.26 |
| N | 86 | | 53 | | 686 | | | |

N.B. - The statistical test employed is one-way ANOVA.
- Difference significant if Sig.(p)<0.05.

*Table 9.95 Post-hoc tests of 8 IL indicators in Chinese Language PA at primary schools with regard to operational sessions*

| Chinese Language IL Indicator | Session (1) | Session (2) | Mean Difference between (1) and (2) | Sig. |
|---|---|---|---|---|
| Define | AM | WD | 0.30 | 0.02* |

N.B. - The statistical test employed Tukey’s honestly significant difference test.
- Difference significant if Sig. (p)<0.05.

# Chapter 10 Summary and Recommendations

This chapter summarizes the overall findings of the study. Students' information literacy (IL) will be described first. Relationship of students' IL competences in specific key learning areas (KLAs) and their technical proficiency will then be delineated. Then, relationship between IL competences across different KLAs and the interaction effects of any two technical competences on each IL competence in specific KLAs will be reported. Finally, findings on students' background factors and the school level factors in relation to their IL competences as well as findings of questionnaires will be reported. A number of recommendations for Information Technology in Education (ITEd) in Hong Kong will also be proposed.

## 10.1 Summary of Findings

### 10.1.1 Students' Information Literacy Competences

Students' performances in Technical Performance Assessment (PA), Mathematics PA, Chinese Language PAs and Science PA in this study are summarized below.

#### *10.1.1.1 Students' overall performance in IL of Technical PA*

Results from the Technical PA indicated that students in the primary, secondary and special schools had good performances in the dimensions of "define", "access" and "manage". It was especially clear in the dimension of "access" where the respective mean score percentage was over 75% for all the students of the primary, secondary and special schools. On the other hand, poor performance was found in the dimensions of "communicate" and "create". For the dimension of "communicate", one explanation for the poor performance might be that the task of "communicate" was placed in the last question of the Technical PA. One might speculate either students did not have enough time to reach the question or they could not answer the question. However, mean score percentage in the dimension of "create" was only less than 5% for students of different school types. Furthermore, it was interesting to note that special school students had a better performance in the dimension of "communicate" than those of secondary school students. It was probably because special school students were more familiar with the use of online forum for communication than secondary school students.

Results also showed that there were significant differences across schools in terms of students' level of IL competences in Technical PA. For primary school students, a smaller dispersion was found in the dimensions of "create" and "communicate", whereas a larger dispersion was found in the dimensions of "access" and "manage". For secondary school students, a smaller dispersion was found in the dimensions of "define", "create" and "communicate" and a larger dispersion was found in the dimension of "evaluate".

It was observed that secondary school students had better performance than primary school students in all the 7 IL dimensions and the results were statistically significant.

#### *10.1.1.2 Secondary and special school students' overall performance in IL of Science PA*

Among the seven dimensions of IL competence in Science PA, results from the PA indicated that students in both secondary schools and special schools had better performances in the "define" and "access" dimensions, and most students could attain at least the basic level of proficiency. It was observed that students were able to use online tools such as chat rooms, MSN and Yahoo! Knowledge to seek help from others. However, in-depth and meaningful discussions were seldom found in the PA.

Poor performances were found in "integrate" and "evaluate" dimensions for both secondary and special school students. It was revealed that students were able to solve simple and straight-forward questions but they were weak in answering questions that required higher-order thinking skills, such as reasoning, generalizing and interpreting data. It was also found that students were not aware of the quality and relevance of the piece of information that they had searched. They did not trace the source of information, compare or contrast different sources of information to evaluate the authenticity of information which they had obtained.

Results also showed that there were significant differences across secondary schools in terms of students' level of IL competences in Science PA. It was found that there were smaller dispersion in the dimensions of "create", "evaluate" and "communicate" and larger dispersion were found in the dimensions of "define", "access" and "integrate". In other words, there were larger differences across schools in the low-level IL skills and smaller difference in higher-order IL dimensions such as "create", "communicate" and "evaluate".

#### *10.1.1.3 Primary school students' overall performance in IL of Mathematics PA*

Very good completion rates were observed for the first three questions of the assessment. Starting from Q4, there was a decline in students' responses and the lowest completion rate was noted in Q6. Moreover, students seemed to perform well in using built-in software tools in the "create" dimension in Q3. Regarding the 7 IL dimensions, better performances were found in "define" and "create" dimensions. Poor performances were found in "evaluate" and "integrate" dimensions. Results also showed that there were significant differences across primary schools in terms of students' level of IL competences in Mathematics PA. Smaller dispersion was found in the dimensions of "define" and "evaluate" but larger dispersion in "access", "manage", "integrate" and "create" dimensions.

#### *10.1.1.4 Primary school students' overall performance in IL of Chinese Language PA*

The overall performance of P5 students was not very impressive. Students performed the best in the dimension of "define", followed by "create", "manage" and "integrate". Most students were able to identify general but not appropriate keywords to search for information, create a table for organizing information and organize information with titles. Performance in “access” was the lowest. This may be due to the relatively low task completion rates of tasks 1.1 and 4. Their performance in the “communicate” dimension was the lowest if those who did not reach or did not respond to the question were excluded. Students performed poorly in those tasks which required higher proficiency of “communicate”. Most of their emails failed to convey the core message of seeking advice from the receiver. They showed rather weak awareness of the social relationship between the receiver and sender.

There were significant differences across primary schools in terms of students’ level of IL competences in Chinese Language PA by ANOVA. It was found that there were smaller dispersions in the dimensions of “define” and “communicate” and larger dispersions were found in the dimensions of “access” and “integrate”.

#### *10.1.1.5 Secondary and special school students’ overall performance in IL of Chinese Language PA*

***Secondary schools***

Students’ overall performance was average. They performed better in the dimensions of “manage”, “define” and “access”. Most students could achieve at least the basic level of proficiency in the tasks of saving files with correct names and using appropriate keywords to search for information while many attained the proficient level in the tasks of organizing information with titles. The lowest performance in IL competence was “integrate”, followed by “evaluate”, and most of the students could just achieve the basic level of proficiency. Students performed badly on “integrate” and “evaluate” probably because they did not demonstrate the ability to present and interpret digital information. Instead of synthesizing, summarizing, comparing and contrasting the information obtained, they simply copied from the original and pasted the information. Students also seemed to be unable to determine whether and to what extent the obtained information satisfied the needs of the tasks, in other words, they failed to demonstrate the capacity to judge the quality, relevance and accuracy of digital information.

There were significant differences across the secondary schools in terms of students’ level of IL competences in Chinese Language PA by ANOVA. It was found that there were smaller dispersions in the dimensions of “define” and “evaluate” and larger dispersions were found in the dimensions of “access” and “integrate”.

***Special schools***

The students’ overall performance was not impressive. Students performed better in the “manage”, “define” and “access” dimensions. If those “not-reached” and “non-response” students are excluded, most students could at least achieve the basic level of proficiency in the tasks of saving files with correct names, organizing information with titles and using appropriate keywords to search for information. The lowest performance in IL competence is “evaluate”, followed by “integrate”. The reason for the poor performance was similar to that of the secondary school students. Students were weak in judging the relevance of a certain piece of digital information and determining the degree to which it satisfied the needs of the tasks.

##### *10.1.1.6 Commonalities and differences across KLAs and levels*

It was found that among the 7 dimensions of IL competence, except primary Chinese Language PA, students had better performance in “define” and “access” across subjects. However for the dimensions with the worst performance, students performed differently in each subject. For Technical PA, poor performance dimensions included “create” and “communicate”. For Mathematics and Science PAs, “evaluate” and “integrate” were the two dimensions in which students performed badly. In primary Chinese Language PA, poor performance results were found in the “access” dimension. For Chinese Language PA of the secondary schools, poor performance was found in the dimensions of “integrate” and “evaluate”.

When examining the variability across the primary schools, larger dispersion was found in the “access” dimension for the 3 sets of PAs and smaller dispersion was noted in the “define” dimension for both Mathematics and Chinese Language PAs. In secondary schools, larger dispersion was found in “access” and “integrate” dimensions for both Science and Chinese Language PAs. The dimension of “evaluate” was with smaller dispersion in the secondary schools for both Chinese Language and Science PAs.

### 10.1.2 Relationship between Students’ Information Literacy Competences in Specific Key Learning Areas and their Technical Proficiency

##### *10.1.2.1 Correlation analysis of the 8 IL indicators in Mathematics PA and Technical PA (Primary school results)*

In exploring the correlation of the 8 corresponding pairs of indicators, all the 8 pairs were positively and weakly correlated. It was also found that except the pair of “create”, the other 7 pairs of indicators were statistically correlated.

##### *10.1.2.2 Correlation analysis of the 8 IL indicators in Science PA and Technical PA (Secondary school results)*

Regarding the correlations of the 8 corresponding pairs of IL indicators in Science PA and Technical PA, five pairs were found to be statistically significant. They were “define”, “manage”, “integrate”, “evaluate” and “total” score. All of the correlation coefficients were relatively small. The strongest pair of correlation was in the “total” score.

#### *10.1.2.3 Correlation analysis of the 8 IL indicators in Chinese Language PA and Technical PA (Primary school results)*

In terms of the correlations between the 8 corresponding pairs of IL indicators in Chinese Language and Technical PAs, all were weakly correlated. Other than the "communicate" dimension, the other 7 pairs were significantly correlated.

#### *10.1.2.4 Correlation analysis of the 8 IL indicators in Chinese Language PA and Technical PA (Secondary school results)*

All the 8 IL indicators in secondary Chinese Language PA and those in Technical PA were correlated significantly but the coefficients of correlation were small. Comparatively speaking, the three stronger pairs of correlations between the two PAs were found in "integrate", "manage" and the "total" score.

### 10.1.3 Relationship between Students' Information Literacy Competences in Different Key Learning Areas

#### *10.1.3.1 Correlation analysis of the 8 IL indicators in Mathematics PA and Chinese Language PA (Primary school results)*

Regarding the correlations of the 8 corresponding pairs of IL indicators of Mathematics and Chinese Language PAs, all indicators were significantly correlated except the pair of "evaluate" and the strongest correlation pair was "total" with r=0.56.

#### *10.1.3.2 Correlation analysis of the 8 IL indicators in Science PA and Chinese Language PA (Secondary school results)*

In general, the correlations between the IL indicators in Science and Chinese Language (secondary) PAs were weak. When examining the correlation among the one-to-one corresponding pairs of the 8 IL indicators in Science and Chinese Language PAs, only four pairs were positive and statistically significant. They were "access", "manage", "integrate" and the "total" score. The correlation between Science and Chinese Language PAs in "communicate" was slightly negative but significant.

### 10.1.4 Interaction Effect of Any Two Dimensions of Technical Proficiency on Information Literacy Competences in Specific Key Learning Areas

#### *10.1.4.1 Mathematics PA*

There were 9 pairs of interactions in Technical PA that had an effect on students' IL performance in Mathematics PA. It was found that the interaction effects between "manage" and the dimensions of "integrate", "create" and "evaluate" in technical proficiency had a significant impact on "communicate" and "evaluate" of Mathematics IL competence.

#### *10.1.4.2 Science PA*

There were 11 pairs of interactions in Technical PA that had an effect on students' IL performance in Science PA. It was found that the interaction effect of 'integrate' and 'communicate' in technical proficiency had a broader impact on Science IL competences in terms of the number of Science IL dimensions being affected. Significant interaction effect was observed in 5 out of 7 dimensions, namely "access", "manage", "integrate", "communicate" and "create".

#### *10.1.4.3 Primary Chinese Language PA*

There were 5 pairs of interactions in Technical PA that had an effect on primary students' IL performance in Chinese Language PA. The interaction of "define" and "communicate" in technical proficiency had a broader effect on primary Chinese Language IL competence. Among the 7 IL dimensions in Chinese Language PA, "manage", "integrate", "communicate", "create" and "evaluate" were affected by the interaction effect of "define" and "communicate" in technical proficiency.

#### *10.1.4.4 Secondary Chinese Language PA*

There were 3 pairs of interactions in Technical PA that had an effect on secondary students' IL performance in Chinese Language PA. The interaction of "access" and "integrate" in technical proficiency had a significant effect on the "define" dimension of secondary Chinese Language IL competence. The interaction of "create" and "define" in technical proficiency had a significant effect on the "integrate" dimension in Chinese Language PA. The interaction of "create" and "manage" in technical proficiency had a significant effect on the "define" dimension in Chinese Language PA.

### 10.1.5 Students' Competences in Information Literacy and their Background Factors

The following sections summarize the findings on relationships between students' IL performance and students' background characteristics (data collected from Student Questionnaire). Special school students' data are excluded from the analysis because of the very small sample size. Background characteristics investigated include gender, years of experience in using computer, and access to computers at home as well as duration of computer usage per day.

#### *10.1.5.1 Gender*

For Technical PA in primary schools, female students performed significantly better in the dimensions of "define", "access", "manage" and "evaluate" as well as the "total" score than that of the male students. In the secondary schools, female students performed significantly better in the dimensions of "create" and "evaluate" as well as the "total" score. For Mathematics PA, it was found that there was no significant difference between male students and female students although boys performed slightly better than girls in most of the dimensions in terms of mean score. In

Science PA, male students had significantly higher scores than female students in the dimensions of "integrate", "communicate" and "evaluate" as well as the "total" score. For Chinese Language PA at primary level, female students outperformed the male students but the difference was only statistically significant for the dimensions of "communicate" and "create" as well as the "total" score. For Chinese Language PA at secondary schools, female students had higher scores in most dimensions, but it was only in the "create" dimension that statistically significant differences in the mean scores were found between male and female students.

#### *10.1.5.2 Years of experience in using computer*

For Technical PA in primary schools, it was found that difference of years of experience in using computer had statistically significant effect on students' performance in "define", "integrate" and "manage" as well as in the "total" score. In secondary schools, statistically significant differences in the performance of students with various years of experience in using computer were found in the indicators of "define", "create", "evaluate" and "total" score.

In Mathematics PA, students with 5 to 6 years of computer experience performed significantly better in the dimensions of "define", "access", "integrate" and "create" as well as the "total" score while students who had 7 or more years of experience performed significantly better in the dimensions of "manage" and "communicate". For Science PA, those who had never used any computer before got the lowest mean scores in all the 8 IL indicators except "communicate". However, all the results were not statistically significant. For Chinese Language PA in primary schools, only in the indicators of "manage", "integrate", "communicate', "create" and the "total" score were the differences significant among group means of students with different years of experience in using computers. For Chinese Language PA in secondary schools, students who had used computers for 7 years or above performed significantly better in the all the dimensions except "define".

#### *10.1.5.3 Access to computers at home*

In both primary and secondary schools, students who did not have computer access at home got the lowest mean scores in all the 8 IL indicators in each PA except in the "communicate" dimension in Technical PA of secondary schools. Significant results in each PA were shown in Table 10.1 below.

*Table 10.1 Indicators in which statistically significant differences were found in relation to access to computer at home*

| PA(s) | Indicators |
|---|---|
| Science | Access and Total |
| Primary Technical | Manage |
| Secondary Technical | Access and Communicate |
| Primary Mathematics | Access, Manage, Integrate and Total |
| Primary Chinese Language | Access, Manage, Integrate, Communicate, Create, Evaluate, and Total |
| Secondary Chinese Language | Access, Manage, Integrate, Communicate, Create, and Total |

#### *10.1.5.4 Duration of daily computer use at home*

For Technical PA in primary schools, it was found that students who used 5 to 7 hours of computer per day had significantly higher scores in half of the 8 IL indicators including "manage", "integrate", "evaluate" and "total" score. For secondary schools, students who spent more than 7 hours daily on computers only performed better in "manage", "integrate" and "communicate" and shared the same highest "total" score with those who spent 2 to 4 hours daily on computer. No significant difference was found among groups of students with different duration of daily computer use. For Mathematics PA, students using 2 to 4 hours per day performed significantly better in "define" and "manage". Those using 5 to 7 hours per day performed significantly better in "access", "integrate", "create" and "evaluate" as well as "total" score. For those using more than 7 hours daily performed significantly better in the "communicate". For Science PA, statistically significant result was only found in "communicate" dimension where students using computer more than 7 hours daily outperformed the others. For Chinese Language PA in primary schools, students using computers 5 to 7 hours per day outperformed the others in all the 8 IL indicators. Results were significant in all the 8 IL indicators except "communicate". For Chinese Language PA in secondary schools, students using computers 5 to 7 hours daily significantly outperformed the others in the "integrate" dimension, and students using computers 2 to 4 hours significantly outperformed the others in the "evaluate" dimension.

### 10.1.6 Students' Competences in Information Literacy and School Level Factors

The following sections summarized the findings of students' IL performance in specific PA with regard to some school level factors. Special school students' data were excluded in the following sections. Factors included ability grouping, medium of instruction, operational session, and school sex as well as school location.

#### *10.1.6.1 Ability grouping*

This analysis was conducted both in primary and secondary schools. There were four ability groupings (high, middle, low and unclassified) in the primary schools and three groupings (high, middle and low) in the secondary schools. For Technical PA, results in primary schools showed that the unclassified group of students performed significantly better with respect to all the 8 IL indicators except "communicate". Results in secondary schools indicated that "high" ability group students performed significantly better with respect to all the 8 IL indicators except "communicate". For Mathematics PA, students from "high" ability grouping schools significantly outperformed the others in all the 8 IL indicators except "access" and "integrate". For Science PA, students from the "middle" ability grouping schools performed better with respect to all the 8 IL indicators except "integrate" and "create" (for "create", same score as the higher ability group) and higher ability groupings performed better in "integrate". These results were statistically significant except in "evaluate". For Chinese Language PA at primary schools, the unclassified group of students outperformed the others with respect to all the 8 IL indicators except "define" and "evaluate". For Chinese Language PA at the secondary schools, students from "high" ability grouping schools had better results in all the 8 IL indicators, which were statistically significant, except "define".

#### *10.1.6.2 Medium of instruction (MOI)*

This analysis was only conducted in secondary schools. In Technical PA, secondary school students using English as the medium of instruction (EMI) significantly outperformed those using Chinese as the medium of instruction (CMI) in "define", "evaluate" and "total" score. In Science PA, the result was slightly different. Students from CMI schools performed better in "define", "access", "evaluate" and "communicate" as well as "total" score than those using EMI and the results were found to be statistically significant by ANOVA. For Chinese Language PA, students using EMI significantly outperformed those using CMI in 7 out of 8 IL indicators. In the "define" dimension, students in EMI also outperformed those using CMI but the difference is insignificant.

#### *10.1.6.3 Operational session*

This analysis was conducted in primary schools only. Students studying in AM schools significantly outperformed the others in the "access" and "manage" dimensions in Technical PA. For Mathematics PA, primary school students in AM schools appeared to have better performance in most of the IL dimensions, but only in the dimension of "integrate" were the differences amongst the primary school students of different school sessions significant. In Chinese Language PA, primary school students studying in "AM session" performed significantly better in the "define" dimension.

#### *10.1.6.4 School sex*

This analysis was conducted in secondary schools only. For Technical PA, students in co-educational schools had significantly better results in the dimensions of "manage" than students in single-sex schools. In the "define" dimension, students in boy's schools significantly outperformed the others. Students in girls' schools performed significantly better in the "evaluate" dimension. In Science PA, it was found that students in boys' schools significantly outperformed the others in the dimensions of "define", "integrate" as well as "total" score. Students in co-educational schools significantly outperformed the others in the "manage" dimension. In the dimension of "communicate", students from both co-educational schools and boys' schools performed significantly better than those from girls' schools. In secondary Chinese Language PA, students in boys' schools performed significantly better in the "define", "access" "communicate" and "evaluate" dimensions than students in co-educational schools and girls' schools.

#### *10.1.6.5 School location*

This analysis was conducted in both primary and secondary schools. According to their school locations, students were grouped into three geographical regions, i.e. Hong Kong Island (HK), Kowloon (KLN) and New Territiories (NT). In the Technical PA for primary school students, no statistical difference was found amongst students from schools located in three regions. For Technical PA at secondary schools, students of schools located in the New Territories performed significantly better in the "manage" dimension. For Mathematics PA in primary schools, students of schools located in HK performed significantly better in the "integrate" dimension whereas students in KLN performed significantly better in the "communicate" dimension. For Science PA, students of schools located in the NT had the highest mean scores in the dimensions of "define", "access" and "manage" as well as the "total" score with significant results in ANOVA. For Chinese Language PA in primary schools, students of schools located in HK outperformed the others in most of the 7 IL dimensions but the results were not significant. For Chinese Language PA in secondary schools, students of schools located in HK significantly outperformed the others in the dimensions of "define", "access", "evaluate" as well as the "total" score.

### 10.1.7 Findings of Questionnaires

Three questionnaires, namely School Head Questionnaire, Teacher Questionnaire and ICT Questionnaire were conducted to examine relationships amongst important indicators, such as curriculum goals in using ICT, resource allocation, teachers' practices and students' practices, the technical proficiency and IL competence outcomes in specific KLAs, for the strategic ITEd goals at the school level. Results will be summarized in the following sections.

#### *10.1.7.1 School Head Questionnaire*

With reference to the ICT use in school, results from the School Head Questionnaire indicated that school heads in the three types of schools alike considered "traditionally important curriculum goals" such as achieving good examination results to be more important than "emerging curriculum goals" which were related to lifelong learning, collaborative inquiry and strengthening of communication skills. Besides, they also indicated that the first priority in resource allocation was given to strengthen teachers' pedagogy and students' competence in using ICT. The second priority was given to the improvement of basic school infrastructure and the third was other manpower resources. School heads also reported that developing a common pedagogical vision among teaching staff in school was the foremost important competence at school leadership that school heads should acquire.

#### *10.1.7.2 Teacher Questionnaire*

Results from Q16 of Teacher Questionnaire indicated that 87.65% of the primary school teachers (including both Mathematic and Chinese Language teachers) had used ICT in conducting learning and teaching activities in the target classes whereas slightly lower percentage (84%) was found for the secondary level teachers (including Science and Chinese Language teachers in secondary schools and special schools). Teachers in the three types of schools reported that they were more competent in the general use of ICT than pedagogical use of ICT. Teachers also expressed that they used ICT more often in "traditional practices" like presenting information or giving instruction. The next one was to use ICT in "lifelong learning practices" like helping students in exploratory and inquiry activities. ICT for "connectedness practices" was not often conducted. Similar result was found in using ICT for students' practices. In other words, ICT was more often used in "traditional practices" like completing worksheet and exercise and used the least in "connectedness practices" like collaborating with peers from other schools within and/or outside the country. Both primary and secondary teachers perceived that not having the time necessary to develop and implement was the major obstacle in using ICT for learning and teaching.

#### *10.1.7.3 Information Technology Coordinator Questionnaire*

Results from ITC Questionnaire indicated that the more commonly available technology-related resources at the primary, secondary and special schools were "general office suite", "mail account for teachers", "communication software" and "multi-media production tool". In addition, "equipment and hands-on material" was also commonly available at the secondary schools. On the other hand, "mobile devices" and "smartboards" were the technological equipment that most schools needed but they did not have. Besides, results also indicated that almost all computers at the primary, secondary and special schools were connected to the Internet and equipped with multimedia devices such as CD-ROM and/or DVD. Furthermore, it was found that the most extensive technical support available to teachers at the primary and secondary schools was "assigning short-task projects in schools". In addition, "introducing students to useful online language resources such as digital dictionaries and translation software" was another common type of technical support available to teachers at the primary schools.

### 10.1.8 Conclusion

To conclude, it was found in this study that in general, students in primary, secondary and special schools could attain the basic level in all the 7 IL dimensions but still rather weak at attaining higher level of proficiency which required higher-order and critical thinking skills. Amongst the 7 IL dimensions of Chinese Language PA, primary school students had better performance in the "define" dimension and worst performance in "access". For both secondary and special school students, they performed better in "define", "manage" and "access" dimensions but worst in "integrate" and "evaluate" dimensions in the Chinese Language PA. Results from Technical PA indicated that students in the primary, secondary and special schools had better performances in the dimension of "access" and worst performance in the "create" dimension. For Mathematics PA, students in primary schools performed better in the "define" dimension and worst in the "evaluate" dimension. For Science PA, both secondary and special school students performed better in the "define" dimension and worst in "evaluate" dimension.

For the overall effectiveness of the strategy for the ITEd, Phase (I) Study indicated that the implementation measures were generally effectual. Similar findings were also observed in the questionnaire survey in this study that teachers and students were capable of using ICT for their teaching and learning. However, this study also revealed that the use of ICT was still focused on "traditional practices" and less in "lifelong practices" and "connectedness practices". Besides, teachers were more competent in the general use of ICT than pedagogical use of ICT. In addition, gaps and discrepancies among schools which took part in this research in terms of infrastructure and professional support were also observed.

## 10.2 Recommendations

The following recommendations are made on the basis of findings from this study as well as the findings and recommendation of Phase (I) Study. We find that most of the recommendations can be grouped under the seven strategic goals of the Strategy entitled "Empowering Learning and Teaching with Information Technology". The only exception is the recommendation relating to the need for a minimum standard for ICT infrastructure and technical support in schools, which is found to be necessary during the course of implementation of the performance assessments in schools. As these minimum standards provide the baseline conditions for the implementation of any ICT in education strategy on learning and teaching, we begin the recommendations with these, followed by other recommendations grouped under the original seven strategic goals.

### 10.2.1 Ensuring Baseline Technology Access in Schools

#### *10.2.1.1 Establish a minimum standard for school ICT infrastructure and a mechanism to effectively ensure that the standard is met by all schools*

Although findings in the Phase (I) Study indicate that IT infrastructure has been set up in all schools and the former EMB has already provided guidelines on school network implementation and IT infrastructure, the findings in this study (despite the small number of sampled schools as mentioned in Chapter 4) reveal that there are great differences between schools in terms of infrastructure, hardware, network configuration, software availability and settings, which result in serious inequities in terms of access for teachers and students in different schools. These differences and inequities can create obstacles to teachers and students in using ICT for teaching, learning and assessment; hence impeding the implementation of e-learning across the curriculum. It is suggested that providing guidelines to schools on ICT infrastructure is not sufficient; instead, the HKSAR Government should establish a minimum standard in terms of ICT access, including the minimum standard and configurations for hardware, software and network infrastructure which form the baseline expectations for the development of e-learning curriculum resources and online assessments. This also ensures that parties involved in the development of curriculum resources and teaching methodologies involving ICT will know the minimum ICT infrastructure they can expect to be available in schools for their implementation.

Furthermore, the HKSAR Government should establish a mechanism to ensure that schools will make sure that their ICT infrastructure is not below the minimum standard.

#### *10.2.1.2 Establishing a benchmark for the minimum level of technical expertise for support staff in schools*

Findings reported in Chapter 4 reveal large diversity in the level of technical expertise of the technical support staff available on the school sites. Although the Government has provided a lot of resources in this area, different schools may take different approaches in using the grant given to them and the variations amongst schools are extremely large. It is considered that in some schools, the lack of technical expertise can seriously limit the learning opportunities available to their students as the technical staff are incompetent and cannot modify or change the software or network settings to implement some basic software tools for learning, teaching and assessment. This poses a serious obstacle to the teachers who wish to try out new learning and teaching practices and/or digital learning resources. It is important to note that there are guidelines for the employment of technological support staff but there is no enforcement mechanism to ensure to what extent such guidelines are appropriately used by schools. It is recommended that the Government should establish a set of up-to-date benchmarks for the minimum expected knowledge and skills for school technicians who look after school ICT infrastructure, that accompanying qualifications be set up to recognize the achievement of such benchmarks, and that schools need to employ qualified technicians for looking after the ICT infrastructure in schools in the same way as the need for schools to appoint properly qualified technicians for Science laboratories in secondary schools. Such benchmarks should be updated on a regular basis.

#### *10.2.1.3 Monitoring and ensuring the minimum standards are met*

To ensure that the above minimum standards are met, schools need to provide evidence for having achieved such standards in order to receive IT-related grants from the EDB and for the approval of IT-related Quality Education Fund projects. These should also form an element in school annual reports and in external school reviews.

### 10.2.2 Empowering Learners with IT

#### *10.2.2.1 Enhancing students' IL proficiency*

From the students' PA results in both technical and KLA-specific tasks, it was found that students performed well at the basic level of different IL dimensions but not at the higher levels. Project-based and problem-based learning activities have been encouraged in schools under the current curriculum reform and many schools have also encouraged students to use ICT in the project-based learning process. However, it has been found that generally students have gained basic IL skills such as "search and access" of information but have not been able to discriminate the quality of information or to analyse and integrate information from different sources for the effective solution of authentic problems. It is recommended that learning activities, particularly projects that provide opportunities to engage students in using ICT to solve ill-structured and authentic problems, should be organised so as to help students to develop the higher-order information literacy skills such as critically evaluating the quality, relevance, and accuracy of digital information, as well as to integrate and apply the new knowledge gained.

#### *10.2.2.2 Establishing a well-articulated IL framework in each KLA*

The Government announced the students' IL framework in 2005 (to be referred to hereafter as IL2005), which comprised of cognitive, meta-cognitive, affective and socio-cultural dimensions of IL. The 7-dimensional IL framework used in this study is a subset of this larger framework selected for operationalization and implementation in this study. As IL is one of the nine generic skills underpinning all subjects in the school curriculum, IL2005 should be used as the baseline framework for different KLAs to develop IL targets and expected levels of achievements that are integrated with the KLA-specific curriculum objectives. However, we find large variations in the kinds of descriptors used for specifying IL integration in different KLAs. In some KLAs, there are delineated descriptors which can develop the IL targeted for different key learning stages, but the descriptions are still relatively vague, without clear indications on the level of achievements expected in each IL dimension. For some KLAs, such descriptors have not been developed. It is recommended that for each KLA, a clear IL framework depicting the levels of achievements expected for different IL dimensions at each key stage is provided.

For example, for Mathematics and Chinese Language Education KLAs, broad descriptors of expected achievement have already been developed across the school curriculum but detailed descriptors of the respective dimensions of IL have not been set. Therefore, it is recommended to re-conceptualize the existing descriptors of expected achievement to levels of indicators in various dimensions of IL across the school curriculum. As there is no descriptor on expected IL achievements in the school curricula in Science KLA, it is recommended that such descriptors delineating the level of achievements in each IL dimension at different key stages should be developed.

### 10.2.3 Empowering Teachers with IT

#### *10.2.3.1 Developing pedagogical designs for implementing the IL framework in learning and teaching in different KLAs*

Based on findings from this study, in addition to the development of KLA-specific IL frameworks that are well-articulated with the generic IL framework (IL2005), the development of well tested, detailed pedagogical designs to integrate the development of higher-order IL competences within the curriculum of specific subjects at different school levels is recommended. Such pedagogical designs can be used both as curriculum resources and professional development resources for teachers in various KLAs. This will help to ensure that teachers know how to incorporate the IL framework into their curriculum and assessment practices.

#### *10.2.3.2 Providing professional development opportunities and exemplar resources for teachers on how to assess students' IL proficiency in the contexts of different KLAs*

As learning, teaching and assessment are important components in any pedagogical implementation, it is important to help teachers understand how to assess students' IL. The findings from this study indicated that students' exposure to this kind of assessment was limited, which might also likely to be unfamiliar to most teachers. It is recommended that professional development opportunities should be provided to teachers on how to develop and use KLA- specific IL assessment tasks. The assessment tasks developed in this study can be used as exemplars in this regard. Unfortunately, the tasks developed in this study only cover two KLAs at two school levels (i.e. P5 and S2). It is recommended that more IL assessment tasks should be developed to provide broader curriculum coverage for teachers in the near future so they can have an in-depth understanding and be able to facilitate and assess the development of IL in the subject areas they teach.

#### *10.2.3.3 Renewing the IT-related professional development programmes for teachers*

In view of the importance of IL proficiency in equipping students to meet the challenge of the 21st century, existing IT-related professional development programmes and practices should be reviewed and renewed to put a clear focus on helping teachers to understand the IL framework, and to learn how to facilitate and assess its development in students. In this conjuncture, it is recommended that a renewed teachers' professional development framework should be put in place and related professional training programmes should be developed to implement the new teachers' framework so as to ensure that such implementation will be KLA-specific and inline with the students' IL framework.

### 10.2.4 Enhancing School Leadership for the Knowledge Age

Research on school effectiveness and educational change indicates that the principal is a key factor in bringing about and in sustaining successful change in schools (Fullan 1992, James and Connolly 2000, Yukl 2002). Principals hence play a crucial role in pedagogical implementation of IT in schools. The former EMB has already run several leadership development courses for school principals to help them recognize the role and potentials of ICT in the curriculum, particularly in the area of curriculum and pedagogical innovation, as well as the importance of and strategies for establishing an ICT strategic plan for a school that links tightly with the priority development goals and vision of the school. However, the introduction of the concept of information literacy, the importance of developing students' information literacy skills in different KLAs and how the school's strategic planning and staff development can be organized to help students achieve the requisite IL standards that have not been included in such courses. The following recommendations aim to enhance school leadership capacity to support the development of students' IL proficiency and the implementation of IL assessment in schools.

#### *10.2.4.1 Building up the basic technology infrastructure for learning and teaching*

The school head manages staffing and resources in the school and hence plays an important role in ensuring the basic conditions necessary for effective implementation of IT in teaching and learning across the curriculum. This includes the establishment and continual maintenance and upgrade of suitable IT infrastructure and appropriate human resource allocation for technical support and curriculum leadership. It is recommended that leadership training programmes for school heads should be provided to heighten their awareness of these issues and to provide them with necessary knowledge and skills to develop school-based IT strategic plans to enhance learning and teaching, and in particular, the generic and KLA-specific IL proficiency of students.

#### *10.2.4.2 Developing a deeper understanding of IL competence*

Findings from School Head Questionnaire indicate that school heads from the primary, secondary and special schools alike considered "traditionally important curriculum goals" such as achieving good examination results to be more important than "emerging curriculum goals" which were related to lifelong learning, collaborative inquiry and strengthening of communication. It would be difficult for school heads to play effective leadership roles if they do not have an appropriate understanding of educational priorities and the importance of developing IL competence in students. It is thus recommended that secondary school heads should be provided with professional/leadership development opportunities to gain a deeper understanding of IL and the KLA-specific nature aspects of IL competence.

#### *10.2.4.3 Enhancing curriculum leadership*

In addition to having a deeper understanding of IL competence, school heads need to understand the need for different subject panels in schools to develop effective pedagogical strategies for integrating IT to different KLAs in order to achieve the targeted IL learning goals. Since the generic technical competence as described in IL2005 underpins the KLA-specific IL competences, schools need to develop effective strategies to ensure that these basic technical skills are mastered, either through a separate IT subject or through integration into specific subject curricula. At present, both approaches can be found in schools. It is recommended that whichever approach a school may adopt, a person in charge of overall curriculum development in the school should be appointed (who may be the curriculum development officer in a primary school or the vice principal (academic) in a secondary school) to coordinate different panels in the identification of the technical IL competences required to support the IL components in various subject curricula for each grade level, and to develop a coordinated approach to ensure that there will not be gaps or significant overlaps in the IL-related curriculum in different subject areas within and across grade levels.

### 10.2.5 Enriching Digital Resources for Learning

In order to achieve high levels of IL competence, in addition to the ability to use general IT tools and digital resources, students need to develop knowledge and skills in the use of KLA-specific digital resources and tools such as modeling and simulations in Science, tools for exploratory geometry and exploratory algebra in Mathematics and geographic information systems in the study of geographic and humanities subjects. The Phase (I) Study also found that the demand for suitable digital resources to support learning in subject knowledge was great (as stated in the Executive Summary of Phase (I) Study). It is thus recommended that key tools and resources for each KLA should be identified and professional development opportunities be provided to introduce these to teachers in the relevant KLAs. In some instances, students need to learn about specialized uses of some generic types of tools and resources as appropriate for the needs of the KLA, e.g. the identification and use of specialized dictionaries and reference tools in language education (e.g. the online dictionary 'the Chinese Syllabary Pronounced according to the Dialect of Canton' to help students learn the different meanings and Cantonese pronunciations for a Chinese character), or the use of Excel to build numerical simulations. Knowledge about the use of open sources and existing web tools such as forums and blogs to facilitate students in engaging in meaningful discussions as well as higher-order thinking skills are also important. It is recommended that strategies should be put in place to ensure that the above kinds of digital resources can be effectively identified and introduced to teachers in meaningful pedagogical contexts. Such uses should also be disseminated to teachers in effective ways.

### 10.2.6 Improving IT Infrastructure and Pioneering Pedagogy using IT

Recommendation 10.2.1 is critical to ensuring the minimum technology infrastructure available in schools to support the integration of e-learning in schools. The following recommendations address issues of improving IT infrastructure and supporting innovative pedagogies using IT.

#### *10.2.6.1 Mechanisms to ensure continual update of the minimum standards for ICT infrastructure and basic benchmarks for technical support expertise in schools*

Findings from relational analysis using data collected through Student Questionnaire indicated that there were correlations between students' achievements and the level of computer access for students. Results reported in Chapter 4 also revealed that digital divide exists across schools in terms of IT infrastructure and the availability of technical support. It is important to note that a strategy to tackle these problems in the form of a one-off solution is not sufficient. It is recommended that mechanisms should be put in place to solicit input from technology vendors, teachers, teacher educators and researchers to continually monitor and review developments on the technology front and to revise the minimum ICT infrastructure standards and technical expertise benchmarks as necessary. It is also recommended that an annual infrastructure testing should be conducted in the same way that regular testing of fire alarm systems is conducted to ensure that the infrastructure is really set up properly to handle the basic usages expected. Such testing may include firewall settings, Windows domain backup and recovery, stress test on service level and bandwidth utilization so as to identify potential problematic areas.

#### *10.2.6.2 Mechanisms to support professional communities of practice for the development and scaling up of innovative pedagogies*

Results from Teacher Questionnaire indicated that teachers were much more strongly oriented towards the traditionally important pedagogies than the 21st century ones in terms of their general teaching practices as well as in their ICT-using teaching practices. On the other hand, using ICT just to enhance traditionally important pedagogies such as teacher lectures, drills and practices and student exercises would not help students to improve their IL competence, particularly not the higher-order abilities. Although the former EMB has already set up a good practices platform for teachers to share their practices in 2004; however, the sharing culture is still at an infant stage. It is suggested that mechanisms should be put in place to support innovative teachers to form cross-school communities of practice to pioneer new pedagogies and support these pioneering teachers to play mentoring roles in the dissemination of innovative practices.

### 10.2.7 Providing Continuous Research and Development

Continuous research and development in ITEd is necessary and it is recommended that the EDB can further initiate and commission research and development projects in the following areas:

#### *10.2.7.1 Extending the current project to other KLAs & grade levels*

The present study focuses on the assessment of IL competence in two KLAs at each of the two grade levels. While the findings from this study already contribute to our understanding of the outcomes of the Strategy in terms of student learning, the insight gained is still very limited and should be extended to cover all KLAs at all school levels. The extension of this research will provide two key benefits. Firstly, the assessment tools and findings will contribute significantly to enhancing teachers' understanding and ability to implement IL-related curriculum and assessment in their pedagogical practices and will also contribute as significant resources for teachers' professional development. Secondly, the results from such research will contribute greatly to evidence-based curriculum and assessment development in the different KLAs.

#### *10.2.7.2 Researching on effective pedagogical strategies to enhance students' IL competence*

Findings from the present study indicated that teachers' adoption of IT in their subject-based teaching improved students' achievement of the basic levels of IL competences, but not the higher-level ones such as evaluation and integration. Hence, research and development efforts should be put in place to identify and disseminate pedagogical strategies that will effectively enhance students' higher-level IL competences in different KLAs.

#### *10.2.7.3 Researching on MOI and development of students' IL competences*

The finding that students in EMI schools achieved higher levels of IL competences in Chinese Language while their achievements in IL in Science were lower when compared to their CMI counterparts is very intriguing indeed. There are many possible explanations, including the possibility that students in EMI schools gain less from their learning in subjects other than Chinese Language, thus hampering their IL competence development. This is a very significant finding that warrants further exploration to gain a better understanding of the factors contributing to such outcome.

### 10.2.8 Promoting Community-wide Support and Community Building

The Project Team agrees with the Phase (I) Study report that parental support is crucial in the success of ITEd implementation. It is recommended that education programmes should be provided to parents to help them gain a better understanding of IL and the impact of IT on students' learning. Better parental support for students, particularly at the primary level will contribute to the enhancement of students' IL competences. Such programmes may be organised through parent-teacher associations, non-governmental organisations and the EDB.

## References

Clarke, S. (2001). *Unlocking formative assessment: Practical strategies for enhancing pupils' learning in the primary classroom.* London: Hodder and Stoughton.

Curriculum Development Council (2001). *Learning to learn 'The way forward in the curriculum'.* Hong Kong, China: The Education Department, Government of the Hong Kong Special Administrative Region.

Curriculum Development Council (2002). *Basic education curriculum guide building on strengths (Primary 1 - Secondary 3).* Hong Kong, China: The Education Department, Government of the Hong Kong Special Administrative Region.

Education and Manpower Bureau (2004). *Information technology in education: Way forward.* Hong Kong, China: Education and Manpower Bureau, Government of the Hong Kong Special Administrative Region.

Education and Manpower Bureau (2004). *Empowering learning and teaching with information technology.* Hong Kong: Education and Manpower Bureau, Government of the Hong Kong Special Administrative Region. Retrieved November 06, 2005, from http://www.edb.gov.hk/index.aspx?langno=1&nodeID=2497 (as at July 2007)

Education and Manpower Bureau (2005). *Information literacy framework for Hong Kong: Building the capability of learning to learn in the information age - information literacy framework for Hong Kong student.* Hong Kong, China: Education and Manpower Bureau, Government of the Hong Kong Special Administrative Region.

Education and Manpower Bureau (2007). *Phase (I) study on evaluating the effectiveness of the 'Empowering learning and teaching with information technology' strategy (2004/2007) final report.* Hong Kong, China: Education and Manpower Bureau, Government of the Hong Kong Special Administrative Region.

Educational Testing Service ETS (2002). *Digital transformation: A framework for ICT literacy.* Retrieved May 02, 2005, from http://www.ets.org/Media/Research/pdf/ICTREPORT.pdf

Fullan, M. (1992). *Successful school improvement: The implementation perspective and beyond.* Milton Keynes: Open University Press.

James, C., & Connolly, U. (2000). *Effective change in schools.* London: Routledge Falmer.

Kuhlthau, C.C. (1987). *Information skills for an information society: A review of research.* Syracuse, NY: ERIC Clearinghouse on Information Resources.

Lennon, M., Kirsch, I., Davier, M.V., Wagner, M., & Yamamoto, K. (2003). *Feasibility study for the PISA (Programme for International Student Assessment) IT literacy assessment report.* The Organisation for Economic Cooperation and Development (OECD). Retrieved May 13, 2005, from http://www.oecd.org/dataoecd/35/13/33699866.pdf

Martin, M.O., Mullis, I.V.S., & Chrostowski, S.J. (Eds.) (2004). *TIMSS 2003 technical report.* Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College. Retrieved July 21, 2005, from http://timss.bc.edu/timss2003i/technicalD.html

Ministerial Council for Education, Employment, Training and Youth Affairs MCEETYA (2005). *National survey of information and communications technology literacy.* Australia: Ministerial Council for Education, Employment, Training and Youth Affairs.

Shashaani, L. (1994). Socioeconomic status, parents' sex-role stereotypes, and the gender gap in computing. *Journal of Research on Computing in Education, 26*(4), 433-451.

Stiggins, R.J. (1999). *Assessment, student confidence, and school success.* Portland: Assessment Training Institute.

Young, B. (2000). Gender differences in student attitudes toward computers. *Journal of Research in Computing in Education, 33*, 204-217.

Yukl, G. (2002). *Leadership in organizations (5th ed.).* NJ: Prentice-Hall, Englewood Cliffs.