Young Children's Learning with Information and Communication Technologies in Hong Kong Kindergartens

A thesis submitted in fulfillment of the requirements for the degree of Doctor of Philosophy

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Abstract

This study investigated the changing roles and teaching and learning practices with Information and Communication Technologies (ICT) in kindergartens in the Hong Kong context. The objectives of the study were (1) to observe and describe the use of computer in early childhood curriculum in Hong Kong; (2) to investigate the teaching practices of kindergarten teachers using computer activities in their classrooms; (3) to explore the perspectives of parents, principals and kindergarten teachers regarding children's learning with computer in Hong Kong early childhood settings and (4) to examine the ways in which children use computer for learning in kindergartens in Hong Kong.

In order to achieve the objectives, this study employed a 'Embedded Design' of mixed methods designs which incorporated the data of qualitative approach into the data of quantitative to provide a supportive, secondary role based primarily on the other data type (Creswell, 2002; 2007). First, a survey in the quantitative design explored a holistic computer environment in kindergarten settings in Hong Kong by collecting the data of access and teaching and learning practices of computer activities in these kindergartens. Second, with the result of the survey, the case study approach was adopted in the qualitative design that played a supportive role based primarily on the quantitative data from the survey. The multi-cases comprised of three non- profit making kindergartens from each region in Hong Kong. The participants of each case included one class of K.3 (5 year old of age) children and their parents, teacher and

principal in each kindergarten. The in-depth data was collected by face to face interviews with all participants for their views on using ICT in early childhood education; and non-participant observations in classes for three hours sessions for five days to investigate the learning and teaching practices in kindergarten settings. The data source also included the lesson plan and teaching evaluation of the teachers; and children's drawing on the concept of computer in their mind. The cases described three levels of integration of ICT in kindergartens and some major findings were produced with suggestions. First, although principals, teachers and parents viewed that ICT is important and essential to the lives of children and teachers in the information age especially for their teaching and learning, there were some complexities including the limitations of ICT resources at school, the knowledge of IT skills and professional knowledge of integrating ICT into the early childhood curriculum that affect the integration of ICT by teachers at schools. Second, the new definition of 'play' with technologies is needed to be identified for children's learning in the social cultural theories. Third, there were three levels of such integration identified; (1) The learning of children was fully supported by ICT which was engaged through the communication and collaboration, exploration and creativity, effective teaching was sustained by a child centered curriculum that ICT was provided that meet the needs and interest of young children on classroom basis; (2) ICT was limited to computers only with which computer activities were implemented by using educational software in mainly drill and practice types that selected by teachers to consolidate children's theme learning rather they were the learning tools in their learning process and (3) computer activities were provided mainly in computer room by a structured program that designed by computer company in market to reinforce the subject learning of children.

Based on the findings of this study, implications are offered to enhance the learning

and teaching with young children include the effective pedagogies of incorporating ICT in early childhood curriculum; the importance of on-going professional teacher training on IT skills and the equal access of the ICT resources for teaching and learning in early childhood settings.

Declaration

"I, Wai Man Leung, declare that the PhD thesis entitled, *Young Children's Learning with Information and Communication Technologies in Hong Kong Kindergartens* is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my own work."

Signature: 

Date: 22nd December, 2009

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Chapter 1

Young Children of the 21st Century

Introduction

Young children in our schools today are students of the 21st century, and as such they are faced with the task of learning in new and innovative environments (Craig, 2000). The role of technology in education has been controversial for over 40 years since the advent of educational television, teaching machines, and computer-assisted instruction became popular. It has become apparent that technology has the potential to change how children think, what they learn, how they interact, and how early childhood teachers can assess their learning (Clements & Swaminathan, 1995). However, it is apparent that the technologies used in early childhood education tend to be less innovative and are frequently limited to drill and practice software types (Yelland, 2001). Further, there has been a reluctant attitude towards using computers by early childhood teachers due to their preconception regarding the appropriateness of technologies for young children (Clements & Sarama, 2003; Cordes & Miller, 2000; Siraj-Blatchford, 2006).

In this context, Chinese parents in Hong Kong expect their young children to learn about computers, and anecdotal evidence suggests that they are eager to enroll their children in a kindergarten that provides computer activities. Further, principals in Hong Kong are aware that one of the goals of having computer activities in their schools is to fulfill parental expectations. This has led to a rapid increase in the number of kindergartens providing computer-based activities as an integral part of their learning programs (Leung, 2003).

The discussion of the issues associated with the educational uses of new technologies will have a significant impact on the ways in which children learn in the 21st century classrooms and influence their attitudes, dispositions, and the quality of their educational outcomes. In particular, early childhood educators and parents need to consider whether computer activities are included in their programs to ensure that they are creating optimal learning environments in kindergartens. A report sponsored by the Alliance for Childhood (Cordes & Millers, 2000) indicated that there is not enough research detailing the impact of computers on the developing minds and bodies of young children. There is a need for early childhood teachers and parents to understand the ways in which young children's learning with information and communications technologies (ICT) occur and the factors that maximize the benefits of these learning experiences in early childhood settings. Significantly, Yelland (1999a, 2001, 2006, 2007) also recognized that effective integration of ICT only occurs in environments where teachers and learners engage in new partnerships for learning.

1.1 Purpose of the Study

The primary purpose of the study reported in this thesis is to examine the changing roles of ICT in education in kindergartens in the Hong Kong context. Additionally, it seeks to collect data about the ways in which children may learn in such technology-based learning environments. The literature shows that the most effective teaching scenarios for learning with ICT involve integrating ICT with early childhood programs to maximize children's learning. Thus, this aspect is considered vital in the study through the contexts in which ICT is embedded into the everyday learning of children and where it is not. Significantly, the findings of this study will provide guidelines to early childhood educators in Hong Kong to assist them in making decisions related to effective teaching and learning with ICT as well as in considering the forms of implementation of strategies and assessment of children who are working in ICT learning contexts.

1.2 Definition of Major Terms

The following definitions will assist readers in their understanding of this study.

Early childhood – The term early childhood usually describes the period of childhood from birth up to eight years of age (Bredekamp, 1987).

Kindergarten –Rao and Koong (1999) defined a kindergarten in Hong Kong as an institutional school, which has 20 or more children during any day, whether or not the 20 are present all at the same time. There are three levels in pre-primary classes in Hong Kong. The first level is lower kindergarten for three- to four-year-olds; the next level is for four- to five-year-olds; and the final level is upper kindergarten for children aged five to six.

Computer hardware – This is the physical equipment of a computer system, such as the central processing unit for the speed of processing, with associated drives for disk monitor, keyboard, and mouse (Wright & Shade, 1994).

Educational software – This refers to the packages of materials designed and provided by computer companies specifically designed for learning in school and sometimes out-of-school care contexts.

Information and Communication Technologies (ICT) – Clements and Swaminathan (1995) defined information and communication technologies (ICT) as including networks accessible through telephone, cellular phones, broadcast, cable, and satellite systems. Learners use a variety of technologies in school, including the computer, CD-ROM, videodisc, and sophisticated software, to access and process information. Interactive multimedia are also used to represent a combination of text, graphics, sound, animation, and video with the difference being the media is under the control of the user (Ambron & Hooper, 1990). Therefore, ICT in the study refers to hardware and software designed to access and process information directly and across distance. It also includes

sound recorders, scanners, digital cameras, video cameras, and telecommunication devices.

Technology-based educational platform – This refers to a specific Web-based platform provided by a computer company in Hong Kong specifically for kindergartens so children can work on customized computer-based learning activities.

1.3 Overview and Aims of the Research

A number of research projects have reported the effectiveness of the use of computers in elementary and secondary students' learning. However, little research has examined the efficacy of computers in early childhood classrooms and none in the Hong Kong context. It is also evident that the effective integration of ICT only occurs in environments where teachers and learners engage in new partnerships for learning (Yelland, 2001). Thus, this study seeks to address the data gap by providing data from early childhood settings in Hong Kong that can complement the global literature.

The specific research aims of this project are as follows:

1. To observe and describe the use of computer in the curriculum in early childhood settings in Hong Kong
2. To investigate the teaching practices of kindergarten teachers who use computer activities in their classrooms
3. To explore the perspectives of parents, principals, and kindergarten teachers regarding children's learning with computers in Hong Kong early childhood settings
4. To examine the ways in which children use computers for learning in kindergarten activities in Hong Kong

These aims lead to the following research questions:

1. How do principals, teachers, and parents view the role of computers in early childhood education in Hong Kong?
2. In what ways do teachers plan for use of computers in their early childhood programs in Hong Kong kindergartens?
3. How is the use of computer integrated into the curriculum in early childhood kindergarten in Hong Kong?
4. What kinds of learning are evident in the computer and in the non-computer activities in Hong Kong kindergartens?

1.4 Context of the Study

This study is designed to gather empirical data about kindergarten children in pre-primary education in Hong Kong to provide a clearer perspective on how the educational context aspect is presented and elaborated upon. To contextualize the study, information on Hong Kong's education system will now be presented.

1.4.1 The Government of the Hong Kong Special Administrative Region

Hong Kong was a British-governed territory and became a Special Administrative Region (SAR) of the People's Republic of China in 1997. It is located on the South China coast and consists of a number of islands including Hong Kong Island, Kowloon, and the New Territories. The overall population density of Hong Kong is one of the highest in the world (6,420 per square kilometer as of June 2005) (Census and Statistic Department, 2006). .The majority of the population of Hong Kong originated from the Guangdong province of (Southern) China and speaks Cantonese, the southern Chinese dialect. Large concentrations of population centers are traditionally in existence on

Hong Kong Island and parts of Kowloon, while the New Territories has been experiencing a rapid increase in growth over the past decade. To house the growing population, young families and children have been moved to the new towns in the New Territories; thus, a large number of preschools are located there.

1.4.2 The Pre-primary Education and Care System in Hong Kong

Pre-primary education is not included in the basic (compulsory) education in Hong Kong. Children who are approximately six years of age start free compulsory primary schooling in government and government-aided schools and then move on to the three years of free compulsory secondary schools. Pre-primary service in Hong Kong refers to provision of education and care to young children from birth to six years of age in kindergartens and child care centers. Most of the kindergartens are privately owned, but some are non-profit institutions operated by churches or charity organizations. They are governed by the Education Department and Social Welfare Department, respectively. The Education Department is responsible for monitoring the kindergartens, while the Social Welfare Department is responsible for monitoring the quality of day crèches and child care centers. Kindergartens cater to children from three age groups: nursery classes for three-year-olds, lower kindergarten classes for four-year-olds, and upper kindergarten classes for five-year-olds (Table 1).

Table 1: Age Groups and Classes in Kindergartens and Child Care Centers in Hong Kong

Types of Pre-primary services	**Age groups/Classes**				
	0-2	**2-3**	**3-4**	**4-5**	**5-6**
Kindergarten	N/A	N/A	Nursery	Lower Kindergarten	Upper Kindergarten
Child Care Center	Crèche	N.1	N.2	N.3	N.4

Childcare centers cater to children from four age groups: N.1 for the two-year-olds, N.2 for the three-year-olds, N.3 for the four-year-olds, and N.4 for the five-year-olds. Day crèches provide services for infants and toddlers under two years of age (Chan & Chan, 2003).

1.4.3 Computer Learning Environment in Hong Kong

In the late 1990s, statements from the education reform documents of Hong Kong (Education Commission, 2000) provided opportunities to advance the use of technology in teaching and learning to meet the needs of young children and suggested the direction of future developments following the review on the nine-year compulsory education in Hong Kong for the use of information technology in schools. It contended the following:

> 8.2.29. As a key task in promoting the curriculum reform and changing the learning and teaching culture, we propose the ED to step up their efforts in promoting moral and civic education and a reading culture in schools, as well as encouraging schools to make use of project learning and information technology properly to enhance students' learning (p.67).

The rapid development of information technology has opened up new domains in all aspects of our lives and creating a new culture in learning and teaching. Thus, the education reform of Hong Kong (Education Commission, 2000) provided opportunities

to maximize the potential use of technology in teaching and learning to meet the needs of children in the technological age:

> 8.2.12. The effectiveness of teaching does not lie in the number of texts taught, but what has been learnt by students. The fostering of a positive learning attitude and the strengthening of students' learning abilities are more important than the imparting of knowledge……..School should make good use of the room thus created to help students foster attitudes and enhance generic skills (including skills in communication, numeracy, information technology, learning, problem-solving, critical thinking, innovating, collaboration and self-management) through diversified and inspiring learning and teaching methods (P.60)

Accordingly, some pre-primary sectors applied for funds, for example, the Quality Education Fund from the Hong Kong Government, to implement information technology in their schools to prepare preschool children for the technological age. They set up computer activities that the children could do during their free play time in a computer corner in classrooms. However, this development was haphazard and unstructured and accordingly did not optimize learning with new technologies.

1.4.3.1 The Computer Laboratory/center and Computer Corner.

The usual computer environment for kindergartens in Hong Kong is either having a computer center or a computer corner in the school setting. A summary of the number of kindergartens and their various uses of computers using the Kindergarten Profile (2000) by the Home-School Cooperation Committee is provided in Table 2. Some kindergartens provide computer activities in the computer center outside classrooms. All children share the computer center in small groups to work on educational software for one session of computer activity, which is frequently about 15-20 minutes each week.

On the other hand, most of the kindergartens set up one computer in the classroom with one to two chairs in the computer corner, allowing the children to play at the computer corner during free play time using software specifically chosen by the class teacher.

Table 2: Computer Learning Environment of Kindergartens in Hong Kong (2000)

Regions	No. of kindergartens	Computer laboratories /centers or computer corners or both	Computer laboratories or centers	Computer corner in classroom
Hong Kong Island	181	117	75	42
Kowloon	269	164	116	48
New Territories	326	229	141	89
Total	**776**	**510**	**332**	**179**

Children either select the software that they will use or are told what they can select by the teacher. Unfortunately, in many instances, children can only choose one particular computer activity as a free play option after they have completed all the main tasks assigned by the class teacher for that day. In reality, Hong Kong children have so many tasks to complete in their classrooms every day that they have very little time left to play in the computer corner.

1.4.3.2 Hardware and Software.

In the late 1980s, without government financial subsidies, some of the private kindergartens set up a few computers in a computer center in their early childhood

classrooms. They used old machines without CD ROM drives, and they were shared between the k.2 and k.3 children (aged four to six years). Some had one computer located in a computer corner for their use (Leung, 2003). Although innovative uses of ICT in early childhood in this technological age include the use of peripherals such as digital cameras with which children can create new resource and communicate their ideas, these are difficult to incorporate with old 1980s machines that are attached to inadequate printers and scanners. Thus, young children miss the excellent opportunities for new learning that would otherwise be possible with up-to-date technologies.

Moreover, there is also the lack of good quality local educational software, and most of the good quality software is presented in the English language and derived from Western contexts. It is often inappropriate for use in the Hong Kong curriculum. Teachers have indicated that they frequently find it difficult to find local educational software that is relevant to children in Hong Kong and to the integrated topics of themes or projects that they use. Therefore, most of the educational software is not used to extend or enrich children's learning in a cohesive way, and local educational and instructional games tend to be drill and practice activities.

Since the late 1990s, there have been three possible sources of computer software for use in kindergartens in Hong Kong. First, tailor-made materials from local computer companies are used for specific kindergartens. Second, commercial packages and teacher-designed materials using simple presentation software tools (e.g., PowerPoint) are used (Leung, 2003). Neither the computer "experts" in computer companies nor the software designs of the commercial market packages had professional knowledge about the nature of early childhood education, and thus most of their computer software is of the drill and practice type and does not facilitate children's explorations and discovery in open-ended contexts. Currently, there also are some kindergartens that use Web-based educational platforms provided by a specific computer company (e.g., www.evi.com.hk). Sometimes, staff employed by the company, together with the kindergarten teachers, design the activities on the platform to integrate the activities more effectively into the curriculum. The platform offers opportunities for the

kindergarten children to work on tailored activities. Additionally, parents can work with their children at home if they have the relevant ICT.

1.4.3.3 Computer Training of Kindergarten Teachers.

Ryan (1993) emphasized the importance of in-service training for early childhood teachers in teaching with technology to keep up with the fast changes in the technological world. Since 1995, kindergarten teachers in Hong Kong have not been exposed to systematic professional development that incorporates the use of computers. The majority of them have little knowledge of and skills in computers, although some may use a computer at home. A number of the class teachers have admitted in professional development sessions that they do not feel competent in designing and implementing computer activities in their classrooms. As a result, some administrative staff from the school office who have experiences in using computers are usually the ones responsible for the design and implementation of computer activities for the children in the computer room.

As an alternative, some kindergartens employ staff from computer companies to design and implement computer activities in their kindergartens. However, as they are not grounded in sound pedagogical and curriculum practices, the planning of such activities are rarely aligned with the recommended principles of learning and teaching, for example, those articulated by Bredekamp and Rosegrant (1994).

More recently, there has been an increased emphasis on computer training for teachers in teacher education programs in Hong Kong. In addition, some kindergarten teachers have sought out computer training outside their working hours to become proficient in using computers. Some teachers have learned to produce their own educational software using simple presentation software, such as PowerPoint, to design computer activities that facilitate the integration of computers into learning contexts related to the implementation of a theme or project that they are exploring in class. Teacher education

programs have emphasized the need to shift the focus of activities from teacher-centered and drill-and practice-oriented to child-centered tasks that encourage exploration and experimentation in diverse ways. Children are encouraged to use multimedia equipment such as digital cameras and scanners freely to explore, discover, and present the information that they have collected related to a theme or project. This way, the role of class teachers has changed from a didactic to a facilitative and supportive role to extend children's learning in valuable ways (Leung, 2003).

1.4.3.4 Integrating Computers into the Early Childhood Curriculum.

It is generally agreed (e.g., Davis and Shade, 1999, Yelland, 2007) that technology should be integrated into early childhood programs to facilitate learning. The main way to achieve this in early childhood programs has been to place computers in one of the learning corners. This may be extended when the children are slightly older and have experienced a more formal curriculum that uses the computer and other new technologies to explore the concepts inherent to integrated themes, where the computer is just one of the many resources. With the vast evolution of technologies, Marsh (2005) found that children were engaged in a range of complex practices outside school contexts, which included widely accessing web sites, using interactive games on digital and satellite television, playing with mobile phones, and using game consoles such as the Play station. With these new technologies, computer can serve as a learning tool for children to think, interact, create, and explore (Elliot, 1996). Shade and Watson (1990) claimed that children can gain the most valuable computer skills for learning only when computers are integrated into the curriculum as a vital element for instruction and are applied to real problems for a real purpose. When this is achieved, young learners can be empowered and engaged in the learning processes using technology as just another resource or a tool, which can assist them to think and to present their ideas. The effective integration of technology into the curriculum requires effort, time, commitment, and even a change of beliefs of teachers (Clements & Swaminathan, 1995). This is often a complicated process and may take time as teachers in Hong Kong early childhood settings, like so many of their international colleagues, experience pressures

related to the demonstration of learning outcomes and reporting methods that rarely incorporate the use of computers and other new media.

With respect to integration, contemporary thinking emphasizes the interrelationships of the disciplines across the curriculum such as language, mathematics, science, and music necessary to achieve the same goal about a particular theme or topic. Katz and Chard (2000) explain the 'Project Approach' is an in-depth study of a topic or thought that usually suggested by children or teacher. The learning activities of a project include group discussion, investigation, role-play, site visit, guest speaker, product display, role-play and sharing (Driscoll and Nagel, 2005). Compare with the traditional thematic approach, the project approach provides additional opportunities for children to grow their knowledge, skills, and dispositions when they ask their own questions, conduct their own investigations and make decisions about their projects (Helm and Katz, 2001, p.2). Furthermore, the learning process of children in a project facilitates children's thinking, problem-solving, and social-negotiation skills (Katz & Chard, 2000).

Moreover, Papert (1993) also recommended that schools should adopt a topic approach in curriculum development to provide opportunities for computers to be used across the curriculum in an integrated way. Additionally, ICT can be used in productive and innovative ways by encouraging children to record and enrich their learning activities (Hong and Trepanier-Street, 2004). It is thus apparent that children need to learn to use technology as a resource to enable them to attempt and complete tasks effectively and in different ways than they would prior to the introduction of the new technologies.

In the late 1990s, a small number of kindergartens had more financial resources which enabled them to integrate computer activities across the curriculum, extra funds which allowed them to employ computer companies to design activities linked with the themes or topics taught throughout the school year. An example can be found at http://www.evi.com.hk, which incorporates a number of such initiatives. Class

teachers and children selected the structured activities from the educational platform on the computer provided by these computer companies and were able to use them for their own purposes. Class teachers with limited opportunities to design and select appropriate content of activities for their pupils have indicated that this is a useful way to encourage the use of computers in their learning environments (Leung, 2003).

1.5 An Overview of the Conceptual Framework

Papert (1993) recommended that computers should be integrated across curriculum areas. It is generally recognized that children should be adept at using new technologies as a resource for learning, and this means that they should have ready access to the resources so they are able to develop new understandings and present their work using a variety of media. Additionally, the position statement developed by the National Association for the Education of Young Children (NAEYC) (1996) on technology and young children emphasized the responsibility of early childhood teachers to examine critically the benefits of technology to children. They contended that computer activities cannot replace the "concrete" (i.e., real world/three-dimensional) experiences that are the foundation of learning in early childhood classrooms. These include activities such as art, blocks, and dramatic play. Instead, they stated that early childhood teachers must find ways to integrate the technology into the curriculum to provide meaningful learning experiences that co-exist with such activities for young children. As well, the planning curriculum of integrating technology with young children as 'Development Appropriate Practice' by NAEYC (2009) more recently advocated:

- Teachers make thoughtful use of computers and other technologies in the classroom, not to replace children's with objects and materials but to expand the range of tools with which children can seek information solve problems, understand concepts and move at their own pace.

- Software is selected to emphasized thinking and problem solving.
- Teachers locate computers to foster shared learning and interaction-children talking about what they are doing, cooperating in solving problems, and helping one another.
- Teachers encourage children to use technology (e.g. cameras, video and audio recorders) to document their experiences and work.
- Technology is used to document children's learning (p.242).

Yelland (1999) suggested five goals for learning in early childhood education that incorporate the use of computers:

- Integration of technology and curricula
- Promotion of active learning, inquiry, and problem-solving environments that encourage the children in individual and collaborative work using higher-order thinking skills
- Use of technology to present and represent ideas
- New definitions of play and a reconceptualization of what constitutes a manipulative, and
- Development of media literacy skills that involve a critical analysis of the use of the technologies and information derived from them

These approaches and suggestions are cognizant of social-constructivist views of learning. Vygotsky viewed learning as an interactive process that depends on the stimulation and support of adults and peers to teach children new skills and build cognitive competence. The "zone of proximal development" of Vygotsky (1978) characterizes the range of tasks that children cannot yet accomplish without help from a peer or an adult from those that they can do when working alone. Thus, by providing children assistance, support and guidance, children are able to build an increasing cognitive competence and use skills that they are able to maintain in their own problem-solving situations despite reduced support. Elliot (1996) and many others

extended this notion of scaffolding to include the computer and other "tools" as scaffolds and believed that young children's learning is supported or "scaffolded" using tools and language. Sheingold (1986) applied Vygotsky's work to children's computer experiences. She found that computers could provide children with opportunities to master tasks that would be extremely difficult without the computers and suggested that this was a form of "scaffolding." Scaffolding in the educational context describes support or mediated learning, occurs through guided participation when a mentor or teacher shares some of the cognitive workload with a child, and is intended to reduce the processing burden involved in bringing cognitive and metagcognitive mechanisms into use during problem solving.

The position statement developed by the NAEYC (1996) regarding the use of technology by young children emphasizes the responsibility of early childhood teachers to examine critically the benefits of technology to children. The major aspects of the statement are as follows:

1. In evaluating the appropriate use of technology, NAEYC applies the principles of developmentally appropriate practice (Bredekamp, 1987) and appropriate curriculum and assessment (NAEYC & NAECS/SDE, 1992). In short, NAEYC believes that in any given situation, a professional judgment by the teacher is required to determine whether a specific use of technology is age-appropriate, individually appropriate, and culturally appropriate.
2. When used appropriately, technology can enhance children's cognitive and social abilities.
3. Appropriate technology should be integrated into the regular learning environment and used as one of the many options to support children's learning.
4. Early childhood educators should promote equitable access to technology for all children and their families. Children with special needs should have increased access when this is helpful.
5. The power of technology to influence children's learning and development

requires that attention must be given to eliminate stereotyping of any group and to eliminate exposure to violence, especially as a problem-solving strategy.

6. Teachers, in collaboration with parents, should advocate for more appropriate technology applications for all children.
7. The appropriate use of technology has many implications for early childhood professional development.

1.6 An Overview of the Research Method

To answer the research questions, this study adopted a mixed methods design. In the first instance, the research required the collection of extensive data on the context of the use of technology in Hong Kong early childhood settings. Thus, a comprehensive questionnaire was developed and sent out to 500 kindergartens in Hong Kong. Based on this survey, three sites were identified as useful for further study, and their staff had agreed to participate. The research phase is comprised of the first stage when the survey was sent out, followed by the development of the case studies, which enabled a more detailed and rich study of the phenomena actually occurring on a daily basis in the three sites.

The kindergartens were selected from each of the administrative regions in Hong Kong. Non-participant observations were made for one k.3 class in each of the kindergartens once a week for five weeks, and these sessions were videotaped for detailed data analysis. Detailed field notes were also taken and transcribed, followed by semi-structured interviews with the parents, teachers, and principals, and non-participant observations of children and teachers.

1.7 Significance of the Study

This study will contribute largely to the research on the impact not only of computers but also of ICTs that are greatly expanding in the lives of young children. As the study investigated the teaching practices used by early childhood teachers in Hong Kong, the pedagogies uncovered in the results of the study will be significant for early childhood teachers to the use of ICT in early childhood classrooms to scaffold children's learning. Further, the findings of the survey represent the different computer environments found in kindergartens in the three regions in Hong Kong. They reveal the nature of resource distribution and provide contexts for multimodal forms of learning for young children in this technological era. This study not only details the awareness of principals and teachers regarding the different learning experiences of children in school but also considers the parents and their views about the use of computers for learning in particular.

1.8 Limitation of the study

As this study was only concerned with the k.3 classes (five to six years of age) in Hong Kong, child care centers, which make up another sector providing early childhood services in Hong Kong, were not included in this study. In addition, the study only investigated the use of computers in each setting as they occurred as a "natural" part of the existing program. No new information about the latest technological developments was provided by the researcher for the teachers.

1.9 Overview of the Thesis

The chapters of this thesis are organized as follows:

1. **Chapter One** provides an introduction to the study. It focuses on the overall context of the study and aims of the research; provides an overview of the conceptual framework and methodology, research questions, and purpose of the study; and presents the definitions of the terms used.
2. **Chapter Two** reviews the relevant bodies of literature underpinning the study.
3. **Chapter Three** presents a detailed description of the design and methodology of the research.
4. **Chapter Four** presents the context and findings of the survey
5. **Chapter Five** presents the different sources of data of case 1 such as observation, interviews, and document collections.
6. **Chapter Six** presents the different sources of data of case 2 such as observation, interviews, and document collections.
7. **Chapter Seven** presents the different sources of data of case 3 such as observation, interviews, and document collections.
8. **Chapter Eight** discusses and reflects on the findings and results of the study

Chapter 2

Literature Review

Introduction

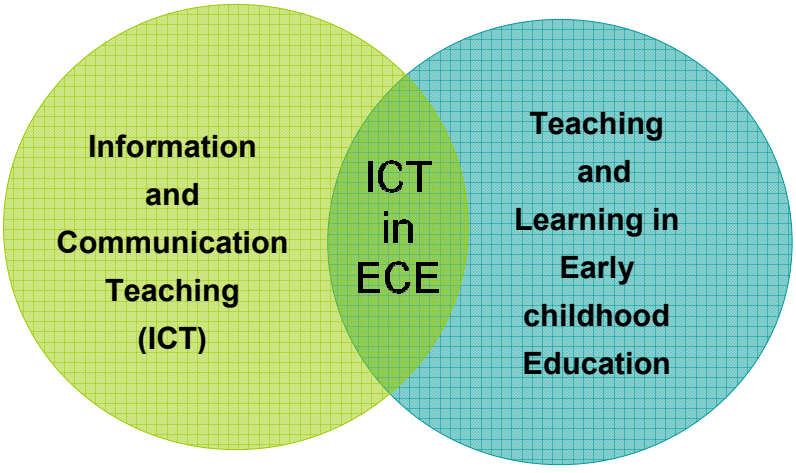
Young children are coming of age surrounded by information and communication technology (ICT) (Berson and Berson, 2010). They are both challenged by and enjoy learning in these new and innovative environments (Craig, 2000). It is readily apparent that new technologies have reshaped societies and the lives that we lead. Because of young people's direct access to new technologies they have been called 'digital natives' (Prensky, 2005) and the 'dot-com generation of the new millennium' (Morrison, 2004). Yet, in the education sector while there have been a number of initiatives to install machines in classrooms, it is debatable whether practices have stayed abreast of the changing landscape.

It has been noted that children use different kinds of media and technologies actively in their home from a young age. (Fletcher-Flinn and Suddendor, 1998; Downes et al., 1999; Rideout, Vandewater and Wartella, 2003). New technologies are capable of changing the way children think, and influences their learning and interaction with others. Therefore, the use of technology in early childhood learning is critical for success in the early years of schooling (Clements and Swaminathan, 1995). In Hong Kong, the

report of the computer and Internet used at home by census and statistical department showed that there were about 75.8% of the family household had personal computers at home and 96.8% of them were connected with Internet (Hong Kong Census and Statistical Department, 2009). For that reason, it is reasonable to assume that the majority of school-aged children have access to a home computer. Therefore, there is an urgent need for early childhood educators to identify and deliberate on appropriate ways of educating children on information and communications technology (ICT), in order to prepare them to become effective future thinkers, citizens and workers in the information age.

This chapter sets the stage for a research study that forms the basis of this thesis. It surveys the literature in three sections to locate the study in the early childhood years and consider how ICT is incorporated into the learning opportunities provided for young children. (Figure 2.1)

Figure 2.1 ICT in Early Childhood Education



The first section explores traditional views of learning in early childhood education. The second section extends this discussion to illustrate ways in which socio-cultural theory broadens this research base to contextualize learning by considering its cultural aspects. The final section reviews the impact of ICT on the learning and teaching of young children in the new millennium. In summary, the case will be made to justify the significance of the current study and its significant contributions to the field.

2.1 Early childhood Education and Learning

2.1.1 Traditional Approaches

In the field of early childhood education, psychological and educational theorists have contended that play is the most effective way to inspire learning. It serves a central purpose and is fundamental to the lives of children from preschool to the early school years (Seefeldt, 1995; Frost, Wortham and Reifel, 2008; Vygotsky, 1978). Play remains one of the fundamental principles in early childhood education in terms of learning and development (Saracho and Spodek, 2002; Wood, 2004; Yelland, 2007). Belief in the benefits afforded by play is based on ideological, philosophical, and pedagogical principles arising from the works of educators such as Montessori, Isaacs, Froebel, and Steiner. Later, it became integral to the research works of renowned psychologist and philosopher Jean Piaget (Piaget, 1972).

Though the essential characteristics of play are frequently described by psychologists, its definition remains elusive. A number of scholars have included conditions that

epitomise play. For example, Rubin, Fein, and Vandenber (1983) include five key elements in their definition. They contend that play is:

- *intrinsically motivated* and that participants play for the sheer satisfaction of doing it;
- *freely chosen* by the participants;
- *pleasurable* so that children enjoy the experience;
- *non-literal* and involves a certain element of make-believe, a distortion of reality to accommodate the interests of the player; and
- *actively engaged* in by the player.

In all the above mentioned conditions, Rubin, Fein & Vandenber emphasized again scholars are adamant that the child must be actively involved, either physically, psychologically, or both. In other words, the child must not be passive or indifferent to what is taking place (as cited in Hughes, 2010, pp.4-5). Thus, psychologists have proposed a number of theories on play and its role in different aspects of child development. However, not a single theory on play has been able to completely explain its significance in children's development (Hughes, 2010). In relation to making meaning and knowledge-building that is inherent in learning, Piaget's cognitive-development theory and, later, Vygotsky's contextual theory, have been widely accepted by educational practitioners and policymakers.

Traditionally, a significant number of early childhood curricula have been based on Piaget's developmental theory (1962). In examining the role of play and learning,

Piaget defined five criteria of play:

1. Play is not a behaviour *per se*, or one particular type of activity among others. It is determined by the certain orientation of behaviour, or by a general 'pole of activity', in which each particular action is 'characterised by its proximity to the pole, and by the kind of equilibrium between the polarised tendencies'. Play is spontaneous, as opposed to the compulsion of work and real adaptation.
2. Play is an activity that young children (and others) do 'for pleasure', while serious activity is directed towards a useful result, that is, irrespective of its pleasurable character.
3. Play is characterised by its relative lack of organisation. Play is considered to be devoid of organised structure and contrasted with serious thought, which is always ordered.
4. Play has freedom from conflicts. Conflicts are foreign to play, or, if they do occur, it is so that the 'ego' may be freed from them by compensation or liquidation, whereas serious activity has to grapple with conflicts that are inescapable (pp. 147-149).

Vygotsky proposed two critical features of play. First, he believed that representational play creates an imaginary situation that permits the child to grapple with desires; children must learn to postpone the gratification of impulses and accept that certain desires will remain unsatisfied in fantasy play. Second, he suggested that representational play contains rules for behaviour that children must follow to

successfully execute in the play scene. He noted that play includes many kinds of activities, such as movement activities, object manipulation, and explorations that are often referred to as play by educators. Furthermore, he recognised that 'real' play has three major features, thus children are able to create an imaginary situation, undertake new ones, act out roles, and follow a set of rules determined by specific roles (Vygotsky, 1978). He emphasised that once the defining features of play are identified, insight into the importance of play in children's development can be gained.

2.1.2 Cognitive-Developmental Approach to Play

Linking 'play' with 'the development of behaviour' is a common focus for developmental researchers. Play research has mainly been carried out within the human developmental paradigm that investigates play among children and its role in learning and developmental processes (Jarvis, Brock and Brown, 2009).

The impact of Piaget's theories in the study of cognitive development was tremendous. Subsequently, play was defined as evolving from the developmental stage-based structure, based on observations of object play among solitary children. Based on this work, Piaget developed three major stages for play. His focus on play's structure rather than content allowed him to view it as a reflection of the developing capacity of children to think symbolically. The shift from the first to the second stage is a shift from pre-symbolic to symbolic play, whereas, the shift from second to the third stage involves symbolising from one point of view to multiple perspectives, which occurs

when children realise the rules of game.

In particular, Piaget was interested in investigating the nature of child development, or how children make sense of the world, how these processes change with age, and how children become increasingly capable of adapting to their environment. He believed that cognitive structures and processing strategies lead children to select from the input what is meaningful to them, and to represent and transform what is selected in accordance with their cognitive structures (Marti, 1996).

Similarly, Piaget's developmental theory posited that intellectual development could only be accounted for by considering the dynamic and continuous interaction between the child and his or her environment. He believed that children are capable of selecting, interpreting, transforming, and recreating experiences to create a fit with existing mental structures. Piaget's cognitive theory regarded play as the means by which change in mental structure occurs via the processes of assimilation and accommodation. Assimilation involves taking something totally new into the intellectual structure while accommodation entails fitting in the new information or idea with existing ones. When children assimilate and accommodate new ideas, they adapt these into their own current organizational scheme by playing with them. Children do not learn a new skill; instead, they present, repeat, and consolidate what they have previously learned and demonstrate those ideas and experiences in play.

Researchers believe that cognitive challenges occur in 'complex' play as children utilize thinking and problem-solving skills, which can be observed in the process of play

(Sylva, Roy, and Painter, 1980). As a result, complex play is regarded as 'high yield' in terms of providing opportunities for children to define their goals and deploy strategies to achieve these goals by planning, responding to feedback, and evaluating the process of activity (Yelland, 2007).

2.1.3 Contextual Approach: Social Cultural Theory to Play

There has been a shift from experimental studies rooted in developmental psychology towards those incorporating socio-cultural frameworks for researching and understanding play. (Bodrova & Leong, 2007) From a socio-cultural perspective, there is substantial evidence that, through play, children demonstrate improved verbal communication, high levels of social and interaction skills, creative use of play materials, imaginative and divergent thinking skills, and problem-solving capabilities. Play and playful forms of activity potentially lead toward increasingly mature forms of knowledge, skill, and understanding (Moyles et al., 2001). Hughes (2010) argued that child's development can never be fully understood without referring to the socio-cultural and historical setting in which it occurs. Thus, it is only with the overall picture that includes the child's family history, economic circumstances, and current social settings that valuable information on learning through play can be gained.

Vygotsky was attributed with initiating this perspective, as he affirmed that learning and development are neither a single process nor independent of each other. He regarded them as being in a relationship of dialectical unity where learning leads, rather than

follows, development. Vygotsky viewed play as activities that lead development forward, contributing significantly to children's capacity to engage in planned and self-regulatory activities (Berk and Winsler, 1995). He believed that this occurred in interactions with others prior to being internalised by individuals, thus contextual learning was of paramount importance.

Steiner and Mahn (1996) addressed the socio-cultural approaches to learning and development applied by Vygotsky and his collaborators. They stated that these were based on the concept that human activities occurred in cultural contexts mediated by language and other symbol systems such as drawing, writing, mapping, and so on; these were 'psychological tools' that enabled the learner to develop and master the mental process.

The use of signs and symbols is a particularly critical feature of play in joint activity, as it is deemed to facilitate social interaction (Wood and Wood, 1996). Learners engage with the 'tools' and the development of higher-level mental process is mediated by the adult or more competent peers. To use these signs, children must communicate and interpret ideas and develop shared meaning via the use of language during play episodes. Thus, mediation enables the learners to develop, practice, and refine their use of these psychological tools and their mastery of new ways of thinking via a process of 'internalisation' in play contexts.

Furthermore, Vygotsky argued that in the play process, 'thought is separated from objects and action arises from ideas rather than things' (1978, p. 97). In creating an

imaginary situation in make-believe play; children learn to act not merely in response to external stimuli, or the immediate objects and events, but in accordance with internal ideas or the meaning of the situation. This supports the emergence of two complementary capacities: the ability to separate thought from actions and objects, and (2) the capacity to renounce impulsive action in favor of deliberate and flexible self-regulatory activity (Berk and Winsler, 1995, p. 54). Vygotsky noted that when children play, meaning is detached from familiar objects and actions. However, a highly interesting contradiction arises when there is fusion between real actions and real objects. This constituted a transitional 'stage between the purely situational constraints of early childhood and adult thought, which can be totally free of real situations' (Vygotsky, 1978, p. 98).

Additionally, the power of Vygotsky's ideas lie in his explanation of the dynamic interdependence between social and individual processes that conceptualise development as the transformation of socially shared activities into internalised processes. He believed that children construct their own understanding and that cognitive construction is always socially mediated. Bodrova and Leong (2007) summarised the Vygotskian approach as follows:

1. Children construct knowledge.
2. Development cannot be separated from its social context.
3. Learning can lead development.
4. Language plays a central role in mental development (Bodrova and Leong, 2007, p. 9)

The work of Vygotsky (1986) considers the social environment as an integral part of the cognitive change process. Based on the concept of constructivism, learning is viewed as intrinsically motivated problem-solving based on personal discovery (Copper, 1993). Similarly, the social context is considered by Bronfenbrenner (1977), who noted that all objects within the child's environment have been either directly or indirectly influenced by culture. The social context should be considered at the following levels (cited in Bodrova and Leong, 2007, p. 10):

1. The immediate interactive level, that is, the individual(s) the child is interacting with at the moment;
2. The structural level, which includes the social structures that influence the child such as the family and school; and
3. The general cultural or social level, which includes features of society at large such as language, numerical systems, and the use of technology.

Wood Vygotsky contended that developmental theories paid little regard to the cultural context of development. He noted that 'the development uniformities established by Piaget apply to the given milieu, under the conditions of Piaget's study. They are not laws of nature, but are historically and socially determined' (Vygotsky, 1962, p. 23). Moreover, he developed his well-known concept of the zone of proximal development (ZPD) to emphasise the importance of determining at least two developmental levels to discover the actual relations of the developmental process to learning capabilities. That is, one in which the child performs individually, and one in which he is scaffolded

in his learning by a more advanced learner. In play, Vygotsky believed that a child could perform above his usual behaviour, as though he were a 'head taller' than himself (Vygotsky, 1978, p. 102). He explained ZPD as being 'the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers' (Vygotsky, 1978, p. 86). In these learning contexts, thinking, speaking, remembering, and problem-solving are achieved through participation in and internalisation of sociocultural-historical forms of activity (Holzman, 1995). The key features of the ZPD are identified as follows:

- Active engagement in joint activity, leading to:
- Social interaction between participants of varied states of experience, knowledge and understand, requiring:
- The use, interpretation, and manipulation (leading ultimately to internalisation) of language (verbal and non-verbal, involving the use of signs and symbols) (Brock, Dodds, Jarvis, and Olusoga, 2009, p. 42).

2.1.4 New Technologies and Play

The theories of Piaget and Vygotsky were conceptualised before technology and ICT. Play materials were three-dimensional objects, either provided by adults or naturally present in the life of children, to manipulate and explore. However, in today's emerging digital age, new materials and sources of play are two-dimensional. Early

childhood educators have been reluctant to embrace them as objects or environments that offer the potential to support play, so much so that, '…it has become increasingly apparent that there is a growing disparity between what goes on in schools and in the world outside' (Yelland, Lee, O'Rourke and Harrison, 2008). The advent of new technology indicates that the toys have changed dramatically in many cases. Children's lives are now infused with modern media like television, video, computer games, the Internet, mobile phones, popular music, and a massive range of media-related commodities available on the market (Buckingham, 2007).

Prensky (2001) regards children of today as 'digital natives' who frequently play in contexts rich with media, thereby possessing developed skills in digital domains via their continuous spontaneous engagement with a variety of digital devices. Studies of surveys conducted by the Kaiser Family Foundation (e.g. 2005) found that, the growth of children is accompanied by media; even those as young as two years old are exposed to media on a regular daily. These children spend a significant amount of time with one or more types of media (Yelland, 2007, p. 3). The study likewise reported that roughly a quarter of the sample regularly engage in two types of media simultaneously, such as listening to the music while working on the computer or reading a magazine while watching TV. Yelland (2007) suggested that this type of behaviour is not only common, it is useful for digital citizens who are recipients of multimodal stimuli in nearly every aspect of their daily lives.

Electronic play is a ubiquitous form of play for millions of children and adults worldwide owing to the increasing access to computers and other digital peripherals in

this technological age (Scarlett et al., 2005). As a consequence, many have become concerned that imaginative, child-powered 'real-world' play is disappearing. They suggest that when children play with pre-programmed electronic toys and computer games, they have little or no opportunity to be imaginative, thereby losing their ability to be creative and extend their imaginations via make-believe play.

The empirical work initiated by the Computers and Children's Electronic Toys Project (CACHET) investigated the manner by which young children interacted with 'smart toys' and associated software in formal and informal learning contexts in their homes, out-of-school clubs, and in primary school (Plowman & Luckin, 2003). The smart toys were installed with 4,000 word vocabularies and programmed to respond children when children squeeze their body parts. Apart from assuming the role of 'helpers' during software use; the soft toys featured an online help function that significantly increased social interactions between children. However, children were observed to prefer seeking help from an adult rather than the toy in more circumstances. Yelland (2007) noted that these particular toys have potential to address the emotional as well as cognitive needs of children when they are learning, but they still needed to play with adults who were able to scaffold the young children's learning in these play contexts. These toys could address gender issues as well, as boys were traditionally inclined to enjoy playing with machines compared with girls. New electronic toys are more attractive for girls and enhance access for students with less advanced verbal and nonverbal skills (p. 152).

The Alliance for Childhood (2004) take a counter view of the role of technologies in

young children lives and have identified two main reasons for the decline of play in contemporary times. First, children are spending an excessive amount of time alone looking at televisions, computer screens, and video games that present prepackaged scripts that stunt imagination. Second, a glut of toys available today takes the control of play away from children and channels them into violent behaviour modeled on popular television, movies, and video games.

Further, Levin and Rosenquest (2001) argued that early years educators should be concerned about the harmful effects of electronic toys, suggesting the 'need to begin to develop strategies for stemming the tide as these toys flood homes and classrooms' (p. 245).

These discussions and varying views on electronic toys are paralleled with the documented resistance to computer use in early childhood education which began in the 1980s, and will be discussed in the next section.

2.2 ICT and Early Childhood

2.2.1 Young Children and New Technologies

Technology's role and appropriateness in the lives of young children have been debated since 1980s (e.g., Barnes and Hill, 1983; Cuffaro, 1984). Early childhood educators

(e.g., Haugland, 2000; Yelland, 1999) confirm that many early childhood practitioners continue to hold the view that screen-based activities are less effective than three-dimensional, manipulative ones. This is despite the growing recognition of ICT's positive impact on children's lives, especially among young children under eight years of age (e.g., Labbo et al., 2000; Luke, 1999; Yelland, 1999; Facer et al., 2003; Marsh, 2004). However, the question regarding the appropriateness of technology for young children is no longer an issue of whether computers should be used in early childhood education. Instead, focus is now on how new technologies can be tapped to make a positive and significant impact on the way young children can learn, as well as on what they learn and how they might interact in their social lives (e.g., Clements, 1999; Haugland, 2000).

Despite positive research results on computer access and use revealing that children's growth, development, and learning are intimately linked with the use of new technologies in their home and school, the Alliance of Childhood reclaims a new definition of technological literacy that will prepare children for life in the new century. They have declared three central arguments in their report:

1. Children face a daunting technological frontier of irreversible changes in human biology and the world's ecology. They need a radically different kind of technology education based on sound values to make wise choices in such a future.
2. Children's lives are increasingly filled with screen time rather than real time with nature, caring adults, the arts, and hands-on work and play. Yet only real

relationships, not virtual ones, will inspire and prepare them to protect the Earth and all that lives on it.

3. There is scant evidence of long-term benefits — and growing indications of harm — from the high-tech lifestyle and education aggressively promoted by government and business. It is time for concerted citizen action to reclaim childhood for children (2004, p. 1).

Thus, in relations to the definition of digital divide in home and schools contexts, Judge, Puckett and Cabuk (2004) enlighten digital equity is a social justice goal that ensure all students have equal access to information and communication for learning, regardless of their social economic status, physical disability, language, race, gender, or any other characteristics that have been linked with unequal treatment.

Another disadvantage discussed in relation to Internet access was noted by Seiter (2005). He argued that the increasing use by young people of short messaging service (SMS), participation in social networking, and various social forums exposed them to predators. He further cited news reports on the growing instances of reported sexual encounters by teenagers who met in online chat rooms as an example.

Despite these so-called negative attitudes, however, new technologies are steeped in the lives of children (Yelland, 2007). Howe and Strauss (2000) identified that a major characteristic of the 'millennial generation' — that is, those born after 1985 — was their fluency in new technologies. As mentioned earlier, Prensky (2005) called them digital natives. This generation of the new millennium is experiencing a world that is very

different from those of previous generations. The digital technologies used by this generation represent relatively recent additions to the 'media-saturated' environment. Though they are far from being equally available to all young people (Buckingham, 2007), they are ubiquitous and form the foundation of interactions in daily life.

In a study of preschool children, Marsh (2005) learned that children were engaged in a range of complex practices outside of the nursery school setting, which included widely accessing Web sites, using interactive games on digital and satellite television, playing with mobile phones, and using game consoles such as the PlayStation. In addition, in a 2006 study entitled 'Digital Beginnings', Marsh et al. examined the ways children (from birth to six years of age) in England utilised popular culture, media, and new technologies at home. The findings provided evidence that children were immersed in digital practices from a very young age. By the time they were ready to attend school for the first time, many were already competent in manipulating a range of technologies (Marsh, 2006, p. 124).

The work by Bers (2010) shows what young children can do with age appropriate technology. In her studies she works with young children, and their families in some cases, to design robots with specific functions. This involves being engaged with powerful ideas in order to instruct the robots to action. It extends the work originally begun by Papert (e.g. 1993) to illustrate that when young children are engaged and challenged they are able to work with sophisticated ideas and communicate their understandings via new technologies. The importance of this for planning early childhood curriculum is significant. It suggests that we go beyond the simplistic to

consider experiences that afford opportunities for young children to become scientists and work through investigations in systematic and meaningful ways.

A survey by the Australian Bureau of Statistics (2000) revealed that Australian families were well equipped with computers and other peripheral devices such as digital cameras, scanners, and printers. The majority of these families had access to a computer at home, with half of them enjoying access to the Internet. With such a wide presence of digital technologies at home, children under five years of age are confident and capable of using a computer (cited from Downes et al., 2001) by the time they are placed in a formal school setting.

Furthermore, Becta (2002) lists a number of products that incorporate a certain aspect of ICT accessible to young children. These include activity centers, musical keyboards, tape recorders, programmable and radio-controlled toys, as well as remote-control devices, photocopiers, telephones, fax machines, televisions, and computers (Becta, 2005, p. 4). The research team broadened the definition of ICT, as defined by the framework in the early years (Learning and Teaching Scotland, 2003), to include different types of technologies embedded in a range of the children's daily experiences. These include a variety of audio-video resources, smart toys and daily technologies, and toys that simulate appliances and tools such as mobile phones, laptops, cash registers, microwaves, and barcode readers. They likewise broadened the definition of ICT to include the texts to which children are exposed when they are learning to read, such as advertisements, magazines, labels, signs, lists, and newspaper as 'environmental print'.

In addition, the study investigated the impact of socioeconomic disadvantages on the development of ICT competence of preschool children at home. The findings revealed that children develop three types of competence — technical, cultural, and learning — via their use of ICT at home. First, technical competence refers to the basic ability to operate the machines for a desired activity. Second, cultural competency refers to children's understanding of the social roles that ICT plays for a range of social and cultural purposes (e.g., entertainment, self-expression, communication, and work). Third, learning competence refers to a subset of cultural competence, which is of particular significance to young children.

The findings likewise implied that ICT was being used at home by young children to support early literacy, numeracy, communication, and musical skills; that ICT helps children to learn through play. Notably, the study identified a number of factors affecting the degree of ICT competence acquired by children, including access to equipment, support for learning to use these equipment, and the particular interests and aptitudes of older family members (pp. 6-7).

Zevenbergen (2007) explored the implications of new technologies in shaping young children's learning, dispositions, and attitudes in contemporary early childhood settings. She concurred that technology was an integral part of the social lives of the new generation, as children nowadays experience diverse social conditions owing to a wide range of communication tools such as e-mail, voice and video conference (e.g., Skype), and instant messengers (e.g., Yahoo or MSN Messenger). She noted that the experiences of Prensky's (2005) 'digital natives' and 'digital immigrants' have been

radically altered by technological toys, allowing them to more fluently work at abstract levels. When these children are placed in the preschool setting, activities traditionally prepared for the younger set are not suited to their needs and interests, causing them to become disengaged, even at an early age. They are interested in electronic media in addition to the traditional, but frequently find the latter being promoted in preschool. This seriously affects their potential and increases the gap between the home and school settings.

2.2.2 Families, Social Inclusion, and New Technologies

In the context of ever-increasing access to ICT both in and outside of school, a study by Li and Atkins (2004) noted that the family income and the educational attainment of the parents were significant indicators of the availability of a computer unit at home. Downes (2002) also addressed the dual effects of computer experience in schools and homes, and studied family computer resources, patterns of use, and their socio-cultural contexts. She identified the different roles played by computers in changing the lifestyle of children. She posited that 'toy use' (for playing games) and 'tool use' (for purposeful work and leisure) were exploratory modes for learning. She maintained that educators must consider the importance of determining technology-based activities that children engage in at home and their significance for learning.

A report conducted by Becta (2005) identified links between children's developing competences at home and at preschool. It was noted that a number of preschool

teachers possessed limited information and experience on the potential learning opportunities for their children using ICT; this was problematic as they were then unable to comprehend the extent to which young children used new technologies at home. The report highlighted that the impact and value of ICT in early childhood was a neglected area both by the parents and teachers of preschool children. Despite this, however, children continued to play with computers at home, thus developing both interest and competencies in technology-based tools.

The Effective Provision of Pre-school Education (EPPE) project conducted by Sylva et al. (1999) underscored the importance of the home-learning environment and considered the aspects of self-reported parental involvement in activities. In pondering the role of computer in the home environment, the report indicated that parents' active support for computer and technology use reflected a more positive attitude towards learning. Children from such households exhibited better social intellectual behavior in school (Siraj-Blatchford and Siraj-Blatchford, 2006). Subsequently, the level of computer use by young children in school was said to be directly influenced by out-of-school experiences (Facer et al., 2000).

Yelland (1999) proposed that teachers in early childhood settings must reassess their concept of play and learning to include digital media, as they were an essential part of play activities for the young in contemporary times. She also maintained that ICT held the potential to enhance learning and promote engagement with ideas in new and dynamic ways. In this context, play anchored on new technologies incorporated various modes of representation, dimensions, and contexts, thus enriching learning in a

variety of ways.

2.3 Teaching Perspectives with ICT in Early Childhood

Traditionally, the role of teacher in children's play is that of a facilitator who oversees how play is implemented in the classroom. In this context, teachers seldom interrupt children when playing as the latter is in control of determining how the play progresses, setting their own boundaries for development. However, a number of early childhood approaches attach structure to forms of play. For example, Froebel supported an informally structured approach. Montessori, meanwhile, adopted more formal sessions in which adults followed the child in their development of abstract capabilities by systematically providing rich sensory materials that would enable them to extend their own development through self-directed learning. These two schools of thought were grounded on the belief that self-directed activity and engagement are essential components of effective learning environments (Yelland, 2007, p. 50).

Theoretically, the teacher's role in Piaget's theory was limited, as he viewed children as being in control of their own development through active curiosity and problem-solving (Scarlett, Naudeau, Salonius-Pasternak, and Ponte, 2005). Adult support include helping children achieve a feeling of security and confidence, and providing physical resources to support development through play materials, particularly in creating an environment where children would be free to play. Children need teachers who know them well, and who will impart a sense of approval, safety, and security. Thus, the

Developmentally Appropriate Practices (DAP) created by the National Association for the Education of Young Children (NAEYC) suggests the following:

> Children should be allowed to direct their own play activities… that they are more likely to feel successful when they engage in a task that they have defined for themselves, and that learning should not be influenced by adult-established concepts of completion, achievement and failure (Bredekamp, 1987, p. 3).

Furthermore, Hughes (2010) emphasised that the teacher's role was to be supportive, and not overly directive with highly structured, teacher-directed activities that decide which activities children must engage in. Within Vygotsky's ZPD, it was emphasised that adults must assume the role of experts to support learning via social interactions that generate challenging situations, requiring the child to think and act beyond his or her independence level. This could be achieved by the process of scaffolding, in which the child achieves higher levels of development of thought and action with the aid of a more experienced adult.

There is a specific and skilled role for the adult in helping the child to move from one level of functioning to another. Wood & Wood (1996) suggested that adults could serve several key tutoring functions by recruiting the child's interest in the task, establishing and maintaining an orientation towards task-relevant goals, highlighting critical features of the task that may be overlooked, demonstrating how to achieve goals, and helping control frustration when immediate success was not achieved (p. 5).

Furthermore, Berk and Winsler (1995) suggested that scaffolding could be implemented through careful questioning of children and setting up the environment conducive for play. To effectively support learning, Wood, Bruner, and Ross (1976) stated that the skilled partners must employ strategies, such as pointing out relevant features of a task, reminding, suggesting, and questioning the child to focus attention, reducing degrees of freedom in a task to manageable limits, and maintaining the direction in problem-solving.

Yelland and Masters (1994, 1995b, 1996, 1997) revealed that scaffolding was not merely cognitive. Upon inclusion of technology in learning, teachers must adopt specific technological scaffolding to support learning. Yelland & Master (2007) noted several key characteristics of scaffolding. First, the interaction must be collaborative, with the learner's own intentions being the aim of the process. Second, the scaffolding must operate within the learner's zone of proximal development. Third, scaffolding must be gradually withdrawn as the learner becomes more competent (p.364).

Scaffolding learning offers many benefits, such as instilling learners with renewed confidence to approach tasks, which then changes their disposition towards learning. Yelland subsequently argued that there was an urgent need to reconceptualise play to incorporate digital-based activities and support the habits of children in the early years; this type of play needed to be scaffolded by adults. Yelland and Kilderry (2005) further highlighted the importance of new technologies in daily life, especially in the education context in the early years. They noted that this must be incorporated into pedagogies to increase the relevance of schooling to the life and experiences of young children.

Yelland and Kilderry (2005) emphasised the need for reconceptualisation of the field from a variety of perspectives. They maintained that traditional frameworks fail to capture the complexity of life-worlds experienced today, or the new ways essential to adapting to unfamiliar educational situations. They outlined a number of new ways for thinking regarding early childhood education and provided a rationale for shifting the traditional foundations of early childhood education to make room for new and much-needed postmodern perspectives and discourse.

Similarly, research (e.g., Clements, Natasha and Swaminathan, 1993; Yelland, 1999) revealed that computers were powerful resources for children's learning in new and dynamic ways because of their capacity to enable the representation of ideas in new modalities and the sharing of findings in a variety of modes.

Siraj-Blatchford and Siraj-Blatchford (2006) identified three areas of young children's learning that could be supported through engagement with ICT: communication and collaboration, metacognition, and creativity.

The most recent position statement developed by the National Association for the Education of Young Children (NAEYC) (2009) continues to emphasise that early childhood teachers are responsible for maximising the benefits of technology to children through the following:

- Making thoughtful use of computers and other technologies in classrooms, not replacing children's experience with objects and materials but expanding the

range of tools with which children can seek information, solve problems, and understand concepts while moving at their own pace

- Selecting software that enables thinking and problem solving
- Locating computers appropriately to foster shared learning and interaction so that children can collaborate in solving problems and communicate while helping each other
- Encouraging children to document their experiences and work
- Inviting children to explore various operations and actions which are possible with technology, through interactions with the community and activities beyond Internet use
- Using technology to document children's learning
- Providing enough equipment so that a child can become engaged in technology-based activities in a sustained manner
- Ensuring equal access for boys and girls to use technology (pp. 174, 316)

Notably, Borko, and Putnam (1995) explored teachers' thinking and beliefs in play as occupying an essential role in their classroom practices (cited in Higgins and Moseley, 2001, p. 204). Their study investigated teachers' perception of the use of ICT and effective pedagogy for literacy and numeracy in primary schools. The research reported the importance of taking teachers' belief systems and practices into account when considering educational change, highlighting the need for reflection in how ICT can affect existing practices.

Thus, Yelland (2007) emphasised that new technologies are an integral part of life,

particularly in the conduct of social, cultural, and technological activities. The skills for integrating technology effectively in teaching practices are a fundamental challenge for early childhood educators.

To a certain extent, this has been achieved in the context of the Reggio Emilia program, an educational philosophy that focuses on preschool and primary education. Hong and Trepanier-Street (2004) documented the process of ICT integration into the Reggio Emilia setting, affirming the view that ICT can be used in productive and innovative ways. In particular, ICT could be tapped not only in documenting activities but in encouraging children to use technologies to record and enrich their learning activities as well. They noted that ICT was useful for the following:

- Providing context for multimodal representations of ideas,
- Sharing or communicating ideas and promoting collaboration among members of the learning community,
- Visualisation, reflection, and thinking for children and teachers, and
- Extending learning environments into the broader community and sharing work with a larger audience.

Collaboration between teachers in the project entailed significant approaches to using ICT, such as documenting the processes of learning, and planning future learning by reviewing and reflecting on such items as digital photographs and videotapes of the activities. It assisted teachers in focusing on the children's intentions, helping them to understand the children's ideas, and in planning to provide new experiences for further

exploration of the children's concepts.

Collaboration between teachers, children, and parents is among the key points being valued greatly in the Reggio Emilia approach. Through the project, Hong and Trepanier-Street (2004) learned that parents contributed to the project voluntarily, accomplishing tasks such as searching for photos or work samples for school projects and discussing activities with their children. Moreover, the teachers utilised classroom Web sites to facilitate communication between children and their parents, as well as with administrators, policy decision-makers, and the wider professional community. Thus, the project provided examples that ICT promoted, extended, and facilitated collaborations and discussions among children, families, and teachers, with the end result being not only a source of growth for teachers but a means of enabling children to build new knowledge in authentic ways.

However, it is unrealistic to expect teachers to incorporate ICT into their programs without professional development opportunities to support them. Ryan (1993) emphasised the importance of in-service training for early childhood teachers regarding teaching with technology, allowing them to keep abreast of the persistent changes in the technological world. Interestingly, the teachers' attitudes towards computers were deemed a crucial factor affecting the quality of children's experience with computers in schools. A study by Bayhan et al. (2002) seeking the views of preschool teachers regarding computer-assisted instruction (CAI) indicated that there was a significant link between teacher's education levels and the use of computers in preschool. Teachers with a higher level of educational attainment were more inclined to recognise CAI's

feasibility in preschool. It was observed that when teachers had undertaken computer training, their attitude towards the use of computers and CAI became positive.

The Alliance for Childhood (2004), fearful that traditional play activities were vulnerable to ICT use in early childhood, suggested 10 principles that early childhood educators and parents should be aware of when contemplating teaching children with technology, curriculum development, and home learning. They recommended that teachers and administers should adhere to the following:

1. Slow down: honor the developmental needs of children.
2. With adolescents, teach technology as social ethics in action, with technical skills assuming a supporting role.
3. Relationships with the real world come first.
4. Technology is not destiny; its design and use flow from human choices.
5. Choice implies limits and the option to say ‘no’.
6. Those affected by technological choices deserve a voice in making them.
7. Use tools and technologies with mindfulness.
8. To teach technology literacy, become technologically literate.
9. Honor the precautionary principle: when uncertain, err on the side of caution.
10. Respect the sacredness of life in all its diversity. (p. 57)

In this manner, the Alliance expressed its support in prioritising traditional learning activities and appealed to teachers not to rethink their current approaches to the DAP-based curriculum.

When Downes et al. (2001) examined effective learning environments for young children incorporating digital resources, they argued that the lack of computers in the early childhood setting represented a resistance from within the field and community who regarded them as being 'neither appropriate nor important' (p. 139). They refuted claims that there was a lack of funding in the early childhood sector to support the purchase of computers as well as the professional development of teachers. They suggested that, in part, the limited use of ICT was basically the result of reluctance to modify practices to incorporate ICT in the curriculum, as educators of early childhood learning failed to grasp the importance of such. Their existing programs suited their philosophy and approach to learning, thus they saw no imperative to change. While they recognised that they should incorporate computers as a standalone activity, they used video and digital cameras merely to record special events.

2.3.1 Curriculum, Pedagogies and ICT

Although there have been pockets of innovation with early childhood educators in the use of ICT, there has not been a groundswell for rethinking early childhood education through extensive use of ICT. While it has been apparent in recent years that schools have been presented with the challenge to integrate ICT in the classroom, early childhood education has positioned itself away from this movement. It has long been believed (e.g., Davis and Shade, 1999) that technology should be integrated into early childhood programs to facilitate a natural aspect of the learning process, and there have been claims (e.g., Shade and Watson, 1990) that children use computers naturally as a

learning resource and incorporate ICT into their lives on a daily basis; however, this integration has only occurred on a limited scale. When young learners are empowered and engaged with learning processes, using technology as merely another resource or tool that can assist them to think and to present their ideas is a natural result. There is no doubt that effective integration of technology into curriculum requires effort, time, commitment, and even a change of beliefs (Clements and Swaminathan, 1995); however, it is now generally believed that excluding technology is disadvantageous to children's learning.

As far back as 1993, Papert recommended that schools should adopt an integrated approach to curriculum development, and link language, mathematics, science, and music in tasks that incorporated computer usage. He argued that children should learn to utilise technology as a tool for approaching any learning situation; this likewise entailed an open-ended problem-solving approach. Papert advocated an approach wherein children were engaged in building new ideas, and where learning was continuous. He believed that immersing and engaging with ideas in an integrated way would enhance learning. He perceived current classrooms as advocating a series of disconnected lessons that were not conducive to learning.

Meanwhile, Bredekamp and Rosegrant (1994) maintained that conceptualising learning as a recurring cycle from awareness to utilisation provided a framework for evaluating the appropriateness of what children could learn from technology. Their nonlinear cycle of learning and teaching was summarised as follows:

> To learn something new, children must become aware, be able to explore and inquire, and then use and apply what they have learned. This process occurs over time and reflects movement form learning that is informal and incidental, spontaneous, concrete referenced, and governed by the child's own rules, to learn that is more formal, refined, extended and enriched; more removed in time and space from concrete references; and more reflective of conventional rules systems (p. 55).

Yelland (1999) suggested five goals that could encourage an effective classroom environment that integrated technology. These were as follows:

1. Integration of technology and curricula
2. Promotion of active learning, inquiry, and problem-solving environments that encourage children to engage in individual and collaborative work using higher order thinking skills
3. Use of technology to present and represent ideas
4. New definitions of play and a reconceptualisation of what constitutes a manipulative activity
5. Development of media literacy skills involving a critical analysis of the use of the technologies and the information derived from them

Importantly, the Alliance for Childhood (2004) emphasized the use of technologies in elementary school children and preschool should be determined by its ability to support and deepen what we consider to be the health essentials of childhood. They concluded

these health essentials:

- Close, loving relationships with responsible adults, at home and at school;
- Direct knowledge of the living world of nature, developed through outdoor play, exploration, gardening and other encounters.
- Time every day for child-initiated play
- Music, drama, puppetry, dance, painting, and the other arts, offered both as separate classes and as a kind of yeast to bring the full range of other academic subjects to life
- Time and space for children to create meaning and experience a sense of the sacred. (p.53)

Unfortunately, Alliance for Childhood (2004) argued that the current technology literacy programs tend to equate technology with electronics and thus fail to promote the important benefits that come from using low-tech tools (p.53). They recommended that new technology literacy should recognize the full range of technical activities available and necessary for healthy growth.

Upon close scrutiny, it can be said that no item in this list would elicit disagreement from advocates of ICT in early childhood programs. However, the Alliance is lobbying for almost total prohibition of ICT use in the early childhood setting. On the other hand, other pundits maintain that ICT should be incorporated into curricula and pedagogical strategies to remain connected to the lives of young children.

O'Rourke and Harrison (2004) explored the new possibilities for early childhood pedagogy and presented several key recommendations:

- Early childhood educators need to consider the diversity of backgrounds, experiences, and levels of computer competency of the children, and build on these.
- Issues of independence, interdependence or dependence, equity and fairness, and self or external regulation are integral to planning effective early childhood curricula.
- Careful observations are vital to early childhood curricula and programs, and teachers must ensure that children are experiencing learning in a variety of modes, while teachers themselves support this learning with a range of pedagogical strategies which naturally incorporate ICT use.

2.3.2 ICT Policy

Evidently, despite a general recognition of ICT as an integral part of young children's lives, there are still those who advocate a traditional approach to early childhood curricula sans ICT usage. This has not detracted education systems from developing policies around the appropriate use of ICT.

A number of policy documents developed in recent times (e.g., NAEYC, The Education of Alberta Government and Scotland) have addressed the issue. For example, the policy framework by Learning and Teaching Scotland (2003) provides four aims for the use of ICT with young children:

1. To develop pedagogy and practice in the use of ICT;
2. To reflect and promote equality and inclusive practice;
3. To ensure all children have access to, and the opportunity to learn about and with information and communication technology; and
4. To develop, fund, and support professional development for all staff.

The ICT program recommended by the Ministry of Education of the Alberta Government (2009) (http://www.education.gov.ab.ca/ict/ictfront.asp) suggests that ICT should be infused within core course and programs. The policy documents recommend that technology is best learned within the context of applications. Furthermore, activities, projects, and problems that replicate real-life situations are effective resources for learning with technology. They recognise that ICT has significantly enhanced and altered human activity, enabling people to live, work, and think in ways that were not previously thought possible. Thus, they developed an ICT curriculum that clusters concepts within three interrelated categories:

- Communicating, inquiring, decision-making, and problem-solving
- Foundational operations, knowledge, and concepts
- Processes for productivity

Processes for productivity refer to the knowledge and skills required to use a variety of basic productivity tools and techniques. Examples include text composition; data organisation; graphical, audio and multimedia composition and manipulation; media and process integration; and electronic communication, navigation and collaboration through electronic means. They have likewise provided statements for the ICT curriculum which include statements on the following:

- General outcomes
- Specific outcomes
- Illustrative examples
- Assessment framework

Through this, the Alberta government built a framework in which ICT usage was embedded in the daily learning of students and teachers, and not separated for special treatment. Similarly, the Ministry of Education of New Zealand (1993) recognised the following:

> Technology is the creative and purposeful use of human knowledge, skills and physical resource to solve practical problems. It involves developing objects, systems or environments (p. 13).

The New Zealand Curriculum Framework (NZCF) (1993) emphasised the importance of developing curriculum to allow graduates to contribute their country's participation in a 'competitive world economy', one characterised by 'technological change' (p.1).

Additionally, the early childhood curriculum policy statement of the New Zealand Ministry of Education (2006) provides children's learning and development within a sociocultural context. Thus, the four broad principles of the statement consist of empowerment, holistic development, family and community, and relationship. Within those principles, there are five strands include well-being, belonging, contribution, communication and exploration. In order to assess these principles and strands, narrative observations, or learning stories, of children's activities and dispositions, with additional evidence of photographic records to highlight the learning processes of young children.

Therefore, technology appears to be an essential learning area in their framework and recognised as being 'at the heart of the economic, social, and cultural reconstruction' (O'Neill and Jolley, 2004, p. 177) in New Zealand. They do not maintain a specific ICT policy for early childhood education but recognise the importance of ICT in early childhood, suggesting that it should be viewed beyond mere use of computers. They recommended the following:

> The use of educational software, digital cameras, and telecommunications are all important aspects of ICT use in early childhood that has not yet received consideration from the Ministry (NZEI, 2001, p. 4).

Regardless of the recognition accorded by many researchers and policymakers globally (e.g., New Zealand, Canada, US, and UK) on the importance and value of ICT in education, including early childhood education, it was not until 1998 that the Hong

Kong Government announced the first strategic plan 'Information Technology for Learning in a New Era: Five-year Strategy - 1998/99 to 2002/03'. This marked the beginning of integrating information technology (IT) into teaching and learning in primary and secondary schools in terms of IT access and connectivity, teacher enablement, curriculum, resources, community participation, and case studies on pedagogical practices. To the disappointment of IT advocates, however, the early childhood sector was not included as one of the target beneficiary groups in the follow-up plan in 2004/05 to 2006/07. To date, there remains no policy on the use of ICT in early childhood programs.

2.4 Summary

This chapter presented a broad overview of the literature pertaining to learning approaches in the field of early childhood education. It revealed that play is regarded as the main vehicle for learning while the more recent social cultural theory has informed educators on the importance of context and culture in learning. It has been observed that research on ICT's impact on the early years of learning has basically been confined to Western countries. As such, research that constitutes the study reported in this thesis marks an opportunity to derive empirical data from a different cultural context, which will add to the discussions in a rich and significant way.

It is generally agreed that ICT use in the early childhood setting is inevitable as many young children are familiar with and use new technologies in every aspect of their lives

in their homes. They arrive in preschool and kindergarten settings as ‘digital natives’ and ICT use becomes appropriate in allowing them to explore in the new formal setting. It appears as if systems and teachers have recognised the need to provide contexts for learning with ICT, but that their use is often idiosyncratic and, at worst, tokenistic.

Pockets of innovative technology usage are documented in Western settings. However, a new wave of practices is not evident. This study was designed to provide information from a non-Western setting to discover ways by which ICT was regarded by teachers, administrators, and parents in Hong Kong. Subsequently, it sought to provide three cases studies on ICT use in early childhood settings. As such, it represents an opportunity to extend the discussion to new social and cultural contexts.

The next chapter will present the methodology used in the study and describe the methods used for collecting data.

Chapter 3

Methodology

Introduction

This chapter provides an overview of the research methods employed and details the manner by which data were collected to address the aims and questions posed at the start of the study. The first section presents the rationale for selecting a mixed method approach to research questions. The second section describes the survey used in the quantitative design of the study. The third section outlines the qualitative design (case studies) embedded in the quantitative design. The fourth section provides additional details about the study in terms of sampling, data collection, administration of the survey questionnaires, data analysis, use of the data from other sources, and details of the research schedule. The final section provides the summary of this chapter.

3.1 Rationale for a Mixed Methods Approach to Research Design

Creswell (2002) and Barbour (2008) define mixed methods research design as a technique for collecting, analysing, and 'mixing' both quantitative and qualitative data

in a single study to comprehend a research problem (p.5). It is commonly used to compensate for the perceived shortcomings inherent in either the quantitative or the qualitative technique as stand-alone methods. It can likewise provide a better understanding of the research problem by building on the strengths of both quantitative and qualitative data, particularly when the study extends from one research phase to another. An example is the researcher's intention to follow up a quantitative study with a qualitative focus to obtain more detailed or specific information compared with those elicited from statistical test results.

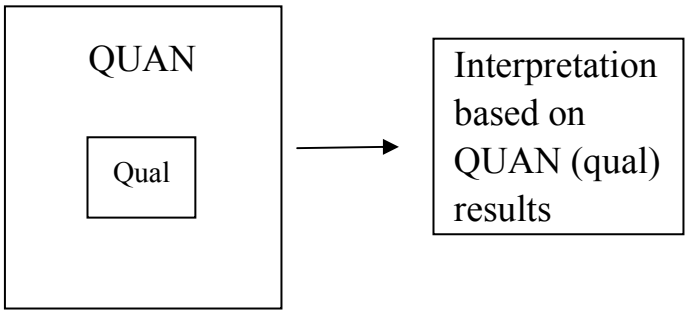
Creswell and Clark (2007) likewise consider mixed methods research as:

> …a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and analysis of data and the mixture of qualitative and quantitative approaches in many phases in the research process. As a method; it focuses on collecting, analyzing, and mixing both quantitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone (p. 5).

Creswell (2007) identifies four major categories of mixed methods designs: Triangulation design, embedded design, explanatory design, and exploratory design. This study utilises an embedded design since, as illustrated by Creswell (2002, 2007),

one data set provides a supportive, secondary role based primarily on the other data type (Figure 1).

Figure 1: Embedded Design



(Source: Creswell & Clark, 2007, p.68)

He further explains that a single data set is frequently insufficient to answer different research questions in a study; each type of question requires different types of data. It is a design suited to the needs of researchers who require the inclusion of quantitative and qualitative data to answer research questions. Thus, this study embraces the embedded design because the case study's qualitative data assume a supportive role based primarily on quantitative data obtained from the survey.

3.2 Quantitative and Qualitative Studies

3.2.1 Quantitative Study - Survey

Descriptive research is important and well suited to the education context. One form of such is a type of quantitative research involving a careful description of educational phenomena (Gall, Borg and Gall, 2007). Surveys have long been a central strategy in social research (Punch, 2003), which, with careful planning, have the ability to support descriptions of educational views and phenomena. These are effective means of enabling researchers to obtain a large and widely distributed sample of the population in a relatively short amount of time (Vanderstoep and Johnston, 2009).

A mail survey was conducted to investigate the computer learning environment of kindergarten schools in Hong Kong. This survey technique presents the advantage of allowing respondents to accomplish the questionnaires at their own pace. Poll participants were not required to have access to a computer or telephone to complete the survey within a reasonable time frame.

As stated in the Introduction (Chapter 1), no survey-anchored studies to date have specifically examined the role and nature of computers in kindergarten learning environments in Hong Kong. According to Yin (1993), surveys are the preferred method for solving research questions which use 'what' and 'how many' types of questions. Furthermore, they can be complemented with 'how' and 'why' questions and be expanded into case studies, life histories, and other experimental designs. In this paper, the case study approach was employed to answer the following research questions: 'How do young children use computers as learning tools in schools?' and 'What do kindergartens principals, teachers, parents, and children think are the benefits for learning that computers provide? Why?

The specific research aims of the project are as follows:

1. To observe and describe the use of computer curriculum in early childhood education in Hong Kong,
2. To investigate the teaching practices of kindergarten teachers in using computer activities in their classrooms,
3. To explore the perspectives of parents, principals, and kindergarten teachers regarding children's learning using computers in Hong Kong early childhood education settings, and
4. To examine the ways in which children use computers for learning in activities in kindergartens in Hong Kong.

These aims lead to the following research questions:

1. How do principals, teachers, and parents view the role of computer in early childhood education in Hong Kong?
2. In what ways do teachers plan for use of computers in their early childhood programs in Hong Kong kindergarten classes?
3. How is computer use integrated into the curriculum in kindergarten classes in Hong Kong?
4. Which learning types are evident in computer and non-computer activities in Hong Kong kindergartens?

3.2.2 Selection and Formulation of Survey Questionnaires

In this study, the survey's objective was to investigate the features of the computer environment of young children enrolled in kindergarten. Convenience sampling was used as the education institute where the researcher was employed had a comprehensive list of all kindergartens that participated in the pre-service teacher education degree program and the institute expressed willingness to support the research by sharing the database. A mailing list was obtained from the early childhood program section with the contact details for all kindergartens that collaborated with the Institute in the teacher education degree programs' practicum component. There were 500 kindergarten schools, including non-profit and private ones, which covered 65% of the whole population (768 in 2003 from the Hong Kong Education Department). Convenience sampling offers ease with which participants can be recruited (Vanderstoep and Johnston, 2009).

The survey was divided into two sections. The first was designed to obtain the background/demographic data while the second contained specific questions on computer usage for learning (Appendix 1). The survey was translated into Chinese, the respondents' primary language. Respondents were instructed to tick or write short responses to 30 question items.

The first section sought to obtain background information, including the size of schools in terms of the number of teaching staff, number of children, staff with computer

training, and the percentage and frequency of computer usage for teaching. The second section was designed to obtain information on the computer-learning environment, including the types of hardware and software used and their specific purpose, as well as other questions on the type and forms of implementation for computer activities in the presence of a computer curriculum.

To ensure clarity, the survey was dispatched to the principal of one kindergarten school for testing prior to the administration of the final survey in all kindergartens in Hong Kong (Neuman, 2009). After the survey was returned by the pilot respondent, a number of questions were revised and certain items were reorganised in different sections. Subsequently, the survey was mailed out and respondents were asked to complete and return the filled-out document using an enclosed self-addressed stamped envelope.

The kindergarten principals were located by mail and requested to return their accomplished questionnaires via fax or post. A cover letter offering information on the project as well as instructions on how to complete the survey was attached to the questionnaire; it likewise guaranteed confidentiality of the project (Appendix 2.a). Each respondent was requested to sign a consent letter as part of the ethical consideration procedures for the research (Appendix 2.b-2.d).

Each questionnaire was assigned an identification number to improve response rate and facilitate ease of checking against a list of sampled respondents. The accomplished questionnaires were securely stored in the office of the researcher.

3.2.3 Background of Respondents.

The target population from the convenience sampling was 500 kindergarten schools, including those in non-profit making and private sectors. Respondents included principals of kindergarten schools from the three regions (Kowloon, Hong Kong Island, and New Territories) in Hong Kong. The qualified respondents possessed Certificates of Early Childhood Education from a Hong Kong educational institution.

3.2.4 Quantitative Data Analysis

The survey was an example of the use of descriptive statistics to investigate the computer-aided learning environment of young children in Hong Kong. The responses were analysed using SPSS software to obtain the frequency distribution among the three regions. The findings will be presented in the next chapter under three themes: number, type, and location (Questions 1-4, 6-7); workstations and frequency of use (Questions 8-12); and associated software and curriculum features (Questions 13-18).

3.3 Qualitative Techniques – Case Study

Upon completion of the survey, planning for case studies of the three kindergartens commenced. According to Punch (1998), case studies are conducted to understand a

case in depth within its natural setting and recognise its complexity and context (p.150). A holistic focus preserves and understands the wholeness and unity of the case. Therefore, it is more a strategy than a method, suited to the research questions posed here. The research required the collection of detailed and extensive data from an in-depth understanding of the phenomenon.

In an attempt to explain the rationale and benefits of conducting case study research, Yin (1993) stipulated the following:

> It can be based on single or multiple-case studies and it can be exploratory, descriptive, or explanatory. An exploratory case study (whether based on single or multiple cases) is aimed at defining the questions and hypotheses of a subsequent (not necessarily case) study or at determining the feasibility of the desired research procedures. A descriptive case study presents a complete description of a phenomenon within its context. An explanatory case study presents data bearing on cause-effect relationships — explaining which causes produced which effects (p. 5).

In view of the abovementioned information, a descriptive case study approach was selected to describe the current situation of Hong Kong kindergartens. Merriam (1990) defined a descriptive case study in education as one that presents a detailed account of the phenomenon under study (p. 27). The descriptive case study approach was adopted in this paper and the following were employed as guidelines to focus on the observations:

1. To define the computer curriculum and its role in kindergartens in Hong Kong;
2. To investigate the teaching practices of kindergarten teachers who incorporate computer activities in their programs;
3, To explore the perspective of parents, principals, and kindergarten teachers on children's computer learning in schools; and
4. To examine the manner by which children create meaning in computer activities.

3.3.1 The Three Cases

Since the literature has demonstrated that family income and the educational attainment of parents were significant issues in determining the presence of a computer in homes (e.g., Li and Atkins, 2004), family income was a factor in the selection of sites. The summary of statistics report from the Census and Statistic Department in Hong Kong (2006) revealed the median monthly domestic household income of Hong Kong Island residents was higher compared with other geographic areas in the Special Administrative Region. Kowloon was the lowest among the three regions. Therefore, three kindergartens were selected, one from each Hong Kong geographic region; all were non-profit institutions. The following pseudonyms were used for purposes of confidentiality: Beachside Kindergarten (Hong Kong Island), Cityside Kindergarten (Kowloon), and Countryside Kindergarten (New Territories).

The first case, Beachside, was a kindergarten situated in a large metropolitan area on Hong Kong Island. It was a non-profit organisation located in a public housing zone.

Parents of the children who attended the school generally worked in jobs that could be described as professional (e.g., accountants, office workers, and entrepreneurs). The 'upper' kindergarten class comprised 30 children taught by a qualified kindergarten teacher. A teacher aide worked with this class for small, hour-long group activities conducted in the morning session daily.

The second case, Countryside, was a kindergarten located in a suburban area in the New Territories region. The kindergarten was a non-profit organisation situated within a public housing zone. Majority of the parents of pupils attending the half- or whole-day program could be described as having a low socioeconomic status. The upper kindergarten class had 28 children taught by two head teachers.

The third case, Cityside, was located in the Kowloon City proper. The kindergarten was operated by a Catholic organisation and located within an old public housing zone in the Kowloon region, within close proximity to the old airport. Majority of the parents of pupils attending the half- or whole-day program worked in jobs that placed them in the lower socioeconomic status group. The upper kindergarten class had 26 children taught by one head teacher and one teacher assistant.

3.3.2 Data Collection

Data collection in qualitative research is flexible and developmental (Punch, 1998). Data is collected until saturation occurs, fulfilling the criteria of adequacy and

appropriateness. In this study, the situational analysis approach was selected because of its richness in description and interpretation of the situation, as well as context of problem (Vanderstoep and Johnston, 2009). Mores (1994) maintains that adequacy is attained when sufficient data have been collected for saturation to occur and variation to become both accounted for and understood. Data is derived from a number of sources. Strauss and Corbin (1990) underscored the importance of these materials in qualitative research:

> The nontechnical literature is comprised of diaries, biographies, letters, videotapes, newspapers, reports and a variety of other materials. They plan an essential role because they can be used as primary data. In most studies, these materials can supplement the more usual interviews and observations (p. 55).

Documents for this study included lesson plans, teacher evaluations and journal entries, videos of activities, an educational software evaluation form, and a number of school memos. Furthermore, a portfolio of children's work samples was collected as 'nonreactive measures' of the study.

Data collection was likewise included via the three major approaches of qualitative research, namely, interviews, observations, and documentation analysis. These approaches ensure triangulation of methods (i.e., the use of more than one methodology to address the same question) to establish the validity and reliability of the data (Vanderstoep and Johnston, 2009).

- *Interviews*

Interviews rank among the major types of data collection methods employed in qualitative research. Interviews allow researchers to gain insights into the experiences of the subjects, their concerns, interests, beliefs, values, knowledge, and ways of seeing, thinking, and reacting to the phenomena under study (Schostak, 2006; Goodwin and Goodwin, 1996). An interview is one of the most powerful methods in qualitative research, providing a rich dialogic context because of the high level of communication and interaction achieved between the researcher and respondents (Punch, 1998, p.176). The conduct of interview was the main source of data in answering the following question: 'What do principals, kindergarten teachers, parents, and children think are the benefits for learning that computers provide?' Respondents for the study included the principal, head teacher, children of one K.3 class and their parents for each case. Interviews were conducted in the kindergarten classes of each case to ensure a familiar environment.

The researcher visited these kindergartens several times prior to conducting the interviews. This allowed the creation of good rapport with the informants. With the permission of informants, the interviews were recorded via a video camera for convenience and facilitation of data analyses. To achieve more flexibility during the interview and pursue serendipitous findings and fruitful directions, the guided interview process was adopted. This approach follows an outline of the questions but not all the prescribed probes, transitions, and follow-ups are established prior to the interview (Vanderstoep and Johnston, 2009, p. 225). The interviews commenced with a question

of a structured type, which means that each respondent started with the same set of pre-established primary questions asked in the same order. There were slight deviations depending on responses.

Informal interviews with children in small groups were organised during playtime to collect comments and feelings towards playing with computers. The interview generally lasted for approximately 30 minutes allowing the children to feel more relaxed while being interviewed in the presence of peers (Appendix 3.a). To understand their knowledge regarding computers, in addition to the questions, children were requested to draw a picture of their thoughts about computers. Subsequently, each child was required to discuss what they had drawn with their group, allowing the researcher and their peers to ask questions about the drawing. Conversations were rich owing to interactions among the children (Punch, 2003).

Interviews with principals were conducted in their offices at each school. These interviews, which lasted for approximately 45 minutes, were conducted after-school hours. The interviews were audio recorded for data analysis. Similarly, interviews with the teacher lasted for approximately 45 minutes and were conducted in their classrooms for convenience. Again, the interviews were audio recorded.

- *Observations*

Observation techniques, which are employed in various research types, are commonly

deemed appropriate and advantageous (Goodwin and Goodwin, 1996). Vanderstoep and Johnston (2009) classify full immersion and artificial immersion as observation. In full immersion, the researcher has a natural membership in the group. In contrast, no such connection exists in an artificial immersion. The latter mode is relevant to this study as the researcher is an 'outsider'. Despite establishing a familiarity with the participants and the environment over time, the researcher was artificially immersed and adopted a non-participatory role.

The teachers and children in the three cases were observed during both computer-based activities and non-computer activities. Additionally, with the permission of both teachers and children, these activities were videotaped to facilitate data analysis. The children were observed and videotaped during and after the said activities. Field notes were made in an effort to promote reflection, interpretation, and analysis (Vanderstoep and Johnston, 2009, p. 239). Appendix 4 showed the form for making observations of field notes in the three cases.

Document Collection

In addition to the observations and interviews, document collection was performed to locate the research in a policy and literature context. This included a variety of extant materials for gathering further information.

A number of documents such as lesson plans, teaching reflection, videos of activities

and educational software evaluation forms were collected. Furthermore, samples of children's works were collected as 'nonreactive measures' of the study. Samples of these documents are attached in the Appendix 6.

As another source of data collection, Bogdan and Biklen (1992) suggested the in-the-field data analysis strategy via informal conversations with key informants and other relevant participants. This could assist the researcher in clarifying ideas, identifying areas for further exploration, and filling an information gap. Thus, the researcher conducted informal conversations with the kindergarten teachers and principals during lunch and tea break-time.

3.3.3 Qualitative Data Analysis

The outcome of a case study is a description and interpretation of the case. Apart from the description of the case's context, it is suggested that researchers present an analysis of the major themes or issues that emerge from the investigation. They may likewise provide interpretations or recommendations (Vanderstoep and Johnston, 2009, p. 210). As a result, data analysis of qualitative research is inductive rather than deductive as it is employed to discover emergent themes (Goodwin and Goodwin, 1996; Teddlie and Tashakkori, 2009).

Coding and memoing are two of the basic operations that stimulate the analysis (Punch 1998). The coding system is developed as the 'heart' of the data analysis, and its

process results in the data being organised into various categories. Unlike quantitative research, where data coding is conducted in the latter phase, the process of data analysis in qualitative research can be accomplished during data collection. Moreover, Bogdan and Biklen (1992) list advantages such as the use of early data analysis as an aid in conceptualising the study's purpose, setting boundaries, and developing the analytical question. The process of data review and reflection assist the researcher in crafting decisions, which lend focus and clarity of purpose to the study by adding the 'observer's comments' or 'interviewer's comments' immediately following a complete session.

There are generally massive amounts of data collected in qualitative research, including field notes, interview transcripts, videotapes, documents and other artifacts (Goodwin and Goodwin, 1996). Researchers organise the information into words, phrases, and behaviours observed and events recorded into meaningful categories. Apart from the three major types of coding classified by Strauss and Corbin (1990) — open, axial, and selective — Bogdan and Biklen (1998) offered several other categories: setting/context codes, definition of the situation codes (perspectives maintained by subject), subject's ways of thinking on people and objects, process codes, activity codes, event codes, strategy codes, relationship and social structure codes, and methods codes. Similarly, the data collected in the study can be preliminarily matched by the following:

- Definition of codes ~ data collected from interviews with principals, teachers, and pupils
- Perspectives maintained by subjects ~ data collected from formal and informal interviews with teachers and pupils

- Process codes ~ field notes and video records based on observations and interviews
- Event codes ~ notes/memos from school meetings, parent meetings, field trips, and so on

Saldaña (2009) notes that data are not coded but are recorded. He divides the coding methods into two main sections, namely, first cycle and second cycle coding methods:

> The first cycle methods are the process that happen during the initial coding of data and are divided into seven subcategories: Grammatical, Elemental, Affective, Literary and Language, Exploratory, Procedural, and a final profile entitled Themeing the Data. Second Cycle methods require analytic skills as classifying, prioritizing, integrating, synthesizing, abstracting, conceptualizing and theory building (p. 45).

Meanwhile, Punch (2000) suggests the following procedure for coding:

> Coding are tags, names or labels, and coding is therefore the process of putting tags, names or labels against pieces of the data (p. 204). The labels attach meaning to the pieces of data and serve a number of functions… The first labels also permit more advanced coding, which enables the summarizing of data by pulling together themes, and by identifying patterns… [T]hese early labels become an essential part of subsequent analysis.

> So basic coding is both the first part of the analysis and part of getting the data ready for subsequent analysis. Advanced coding is the same activity – labeling and categorizing – applied at higher levels of abstraction with the data… There are two main types of codes: descriptive codes and inferential (or pattern) codes (p. 205).

Furthermore, Punch (2000) notes that the first level coding mainly employs descriptive codes for summarising the data segments, which in turn provide the basis for higher-order coding at the latter stage. For this reason, the latter codes are more interpretive, requiring a certain degree of inference and focus on pattern codes.

The next basic operation is memoing. According to Saldaña (2009), the purpose of analytic memos is to document and reflect on the coding process, how the process of inquiry takes shape, and what the emergent patterns, categories and subcategories, themes, and concepts are (p. 32).

Consequently, the researcher determines the structural coding method for all overview data in the first cycle to harmonise the study's conceptual framework and the descriptive coding for field notes and documents. This enables analysis that attempt to address the research questions. In the second cycle coding methods with pattern coding and/or focused coding, issues were raised and categorised for discussion and recommendation in relevant chapters (Saldaña, 2009).

3.4 Ethics Approval

Ethical clearance was approved for this study. Prior to the actual study, a cover letter, along with the survey, was sent out to principals, teachers, and parents to introduce the purpose of the survey. The document provided the contact information of the researcher to address queries from participants (Appendix 2.a). In the letter, it was emphasised that the real names of participants would not be disclosed and that they had the right to withdraw from the study at any given time. Data collection techniques were explained as well.

The participants were informed that observation of class activities would be conducted and that teachers and pupils would be videotaped to facilitate data analysis. They were likewise informed that all interviews would be either videotaped or audio recorded. The consent form for parents asked whether the children would be allowed to participate in either the class observations or the interview, or both (Appendix2.d). The letter clearly stated that all results would be published in a doctoral thesis, certain education journals, and conference presentations. The letter and consent form were distributed by principals on behalf of the researcher.

Similarly, principals and teachers in the three cases were informed on the purpose of study and the methods for data collection. Additionally, they were informed regarding the video recordings and advised of their right to withdraw from the study at any time. All principals and teachers confirmed their participation (Appendix 2.b, 2.c).

3.5 Summary

This chapter presented the details of the research methods employed in the study. The selected design was an embedded research design in the context of a mixed methods study; this included a quantitative study utilising a survey and a qualitative component incorporating an embedded case study. The rationale for the mixed methods approach was discussed and justified based on its appropriateness to the study. In relation to the quantitative study, the design, purpose, and formulation of survey questions were presented, as well as the data analysis by SPSS. The rationale for selecting cases for the qualitative study and the research tools for collecting and analysing the data were also presented. The next chapter will present the results and discussion of the quantitative component, namely, the case study.

Chapter 4

Kindergarten Profiles

Introduction

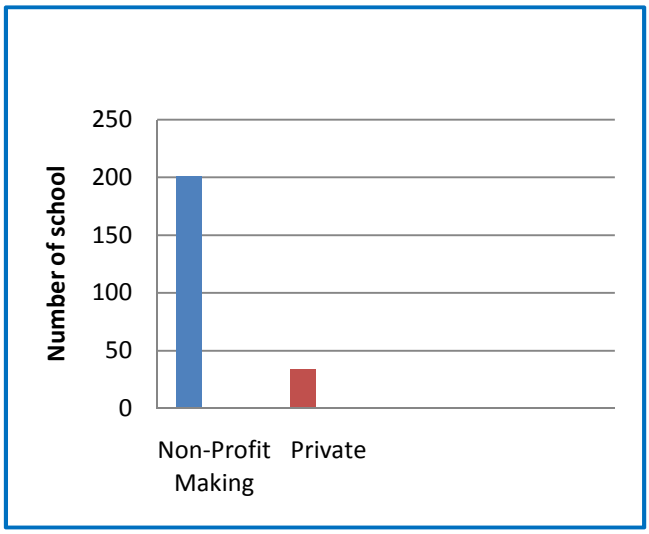
This chapter presents the descriptive data of the survey for the quantitative study. It describes the demographic characteristics and background of the respondents and examines the items used for the data collection. Their responses were recorded and analyzed using a statistical package SPSS version 10. The results are presented in tables and with figures, when appropriate, in two main sections. In the survey, the first section provides the details of the background of the respondents, while the second section deals with their views of the computer learning environment in kindergartens.

4.1 Descriptive Data

4.1.1 Number, Type, and Location of Computers in the Kindergartens

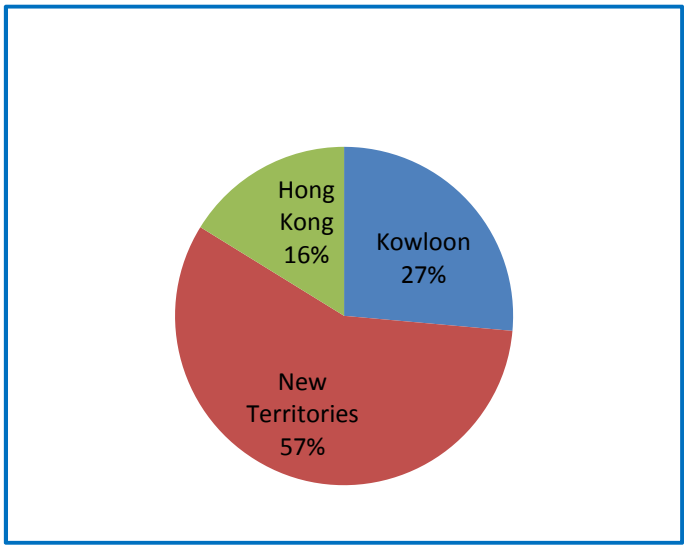
There were 235 respondents; 201 of them were from non-profit making centers, while 34 were from profit-making ventures, as shown in Figure 2.

Figure 2: Types of Respondents



Most of the kindergartens were located in the New Territories (*N=135*), followed by Kowloon (*N=62*), and then Hong Kong Island (*N=38*), as shown in Figure 3.

Figure 3: Location of Respondents



About one-third of the schools had over 250 children (*N=74*). A few of them had less than 50 children (*N=10*), and some had less than 100 (*N=27*). The rest was divided into groups having less than 150 (*N=45*), less than 200 (*N=42*), and less than 250 (*N=37*), as shown in Figure 4.

Figure 4: Population of Students

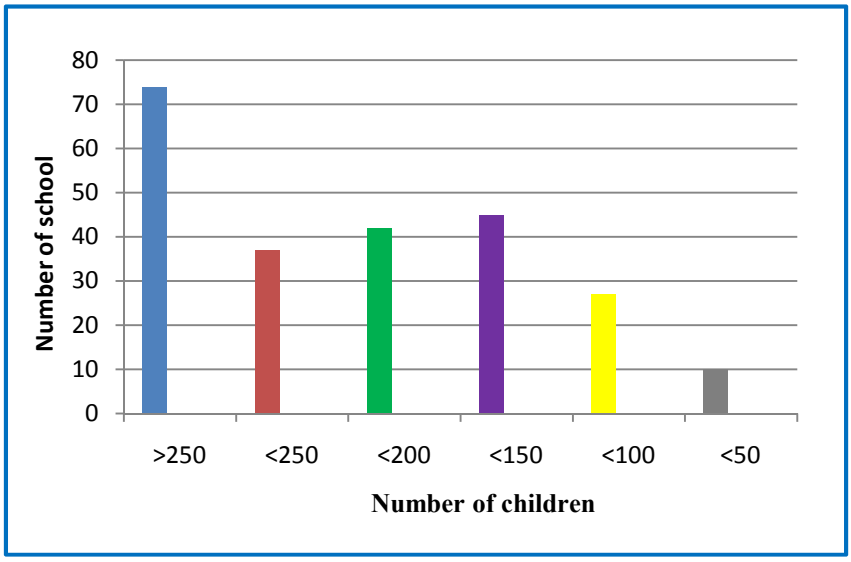


Figure 5 shows the distribution of the teachers in schools. There were 23 schools that had less than five teachers. The majority had 5 to 10 teachers (*N=63*) and 10 to 15 teachers (*N=77*). Some kindergartens had 15 to 20 teachers (*N=47*), and some had more than 20 (*N=24*)

Figure 5: Number of the Teachers in Kindergartens

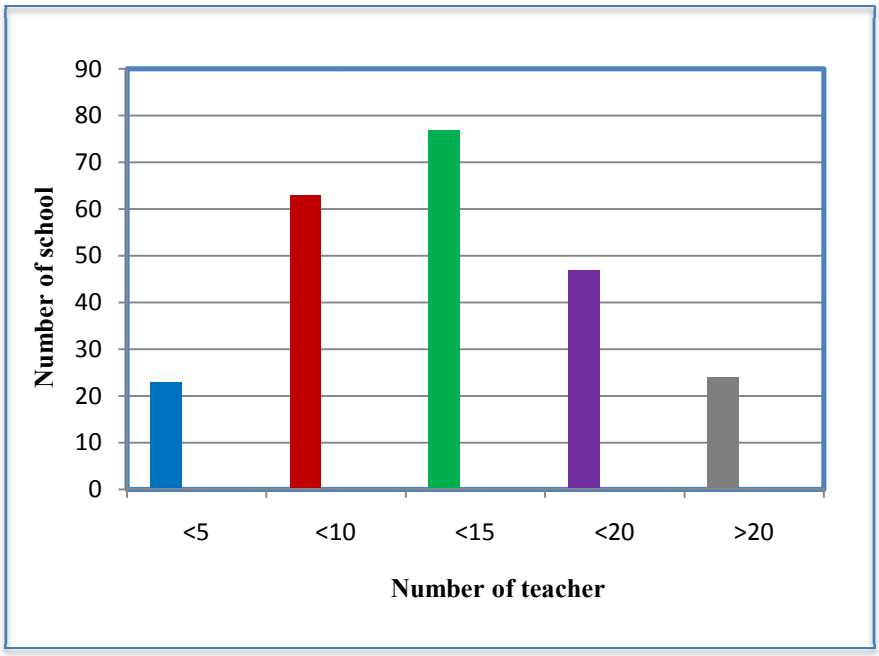
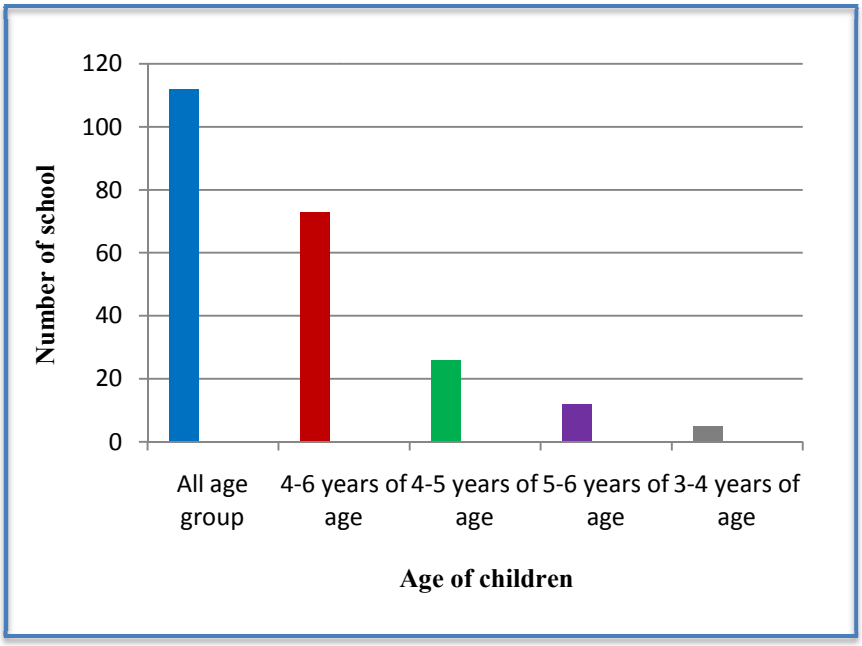


Figure 6 shows the distribution of the age groups of children who were provided with computer activities by the kindergartens in the survey. Almost all the interviewed kindergartens had computer activities (*N=233*). In half of the schools (*N=112*), these activities were provided for children of all age groups, that is, the ages three to four years, four to five years, and five to six years. One-third of the schools provided computer activities for children aged four to five and five to six only (*N=73*).

Some schools provided activities for the age group of four to five years only (*N=26*), and the others provided for the age group of five to six years only (*N=12*). Only a few schools provided activities only for children aged three to four (*N=5*).

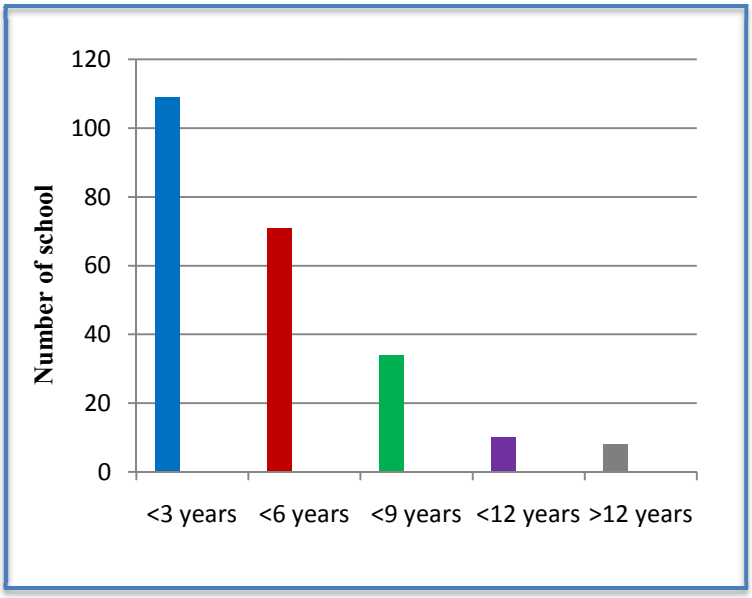
Figure 6: Distribution of Age Groups of Children Provided with Computer Activities



4.1.2 Frequency of Use of Computers

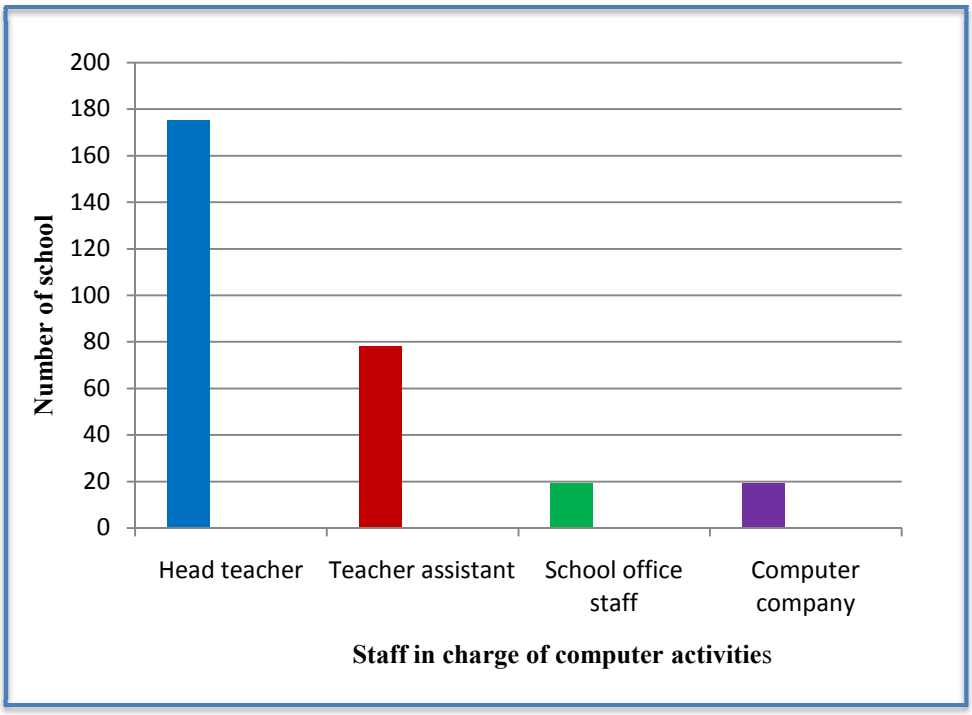
As shown in Figure 7, most of the schools were engaged in computer activities for less than three years (*N=109*), followed by three to six years (*N=71*). The rest started providing computer activities 6 to 9 years ago (*N=34*) and 9 to 12 years (*N=10*) ago. Only a few started more than 12 years ago (*N=8*).

Figure 7: History of Providing Computer Activities



As shown in Figure 8, in most of the schools, the head teachers are responsible for the implementation of computer activities (*N=175*). In one-third of the kindergartens, the teacher assistants were also responsible (*N=78*), and an equal number of schools relied on the staff from the school office or computer companies to organize computer activities (*N=19*).

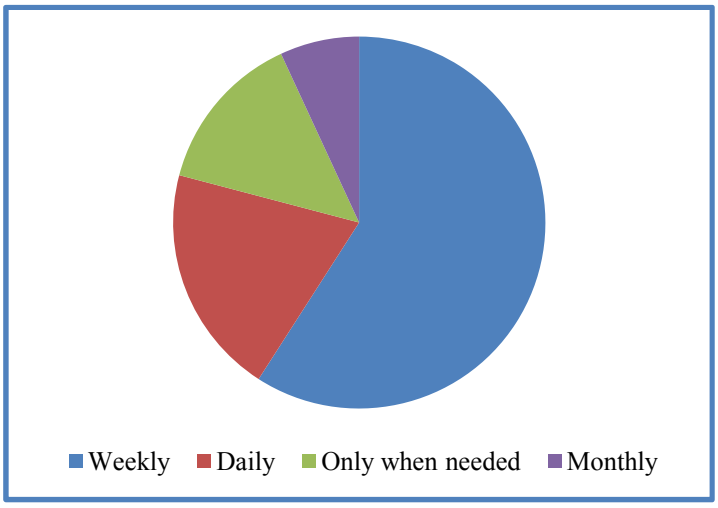
Figure 8: Staff in Charge for the Implementation of Computer Activities



When investigating the percentage of teachers using computers in teaching, the usage was distributed over two extremes. Most of the schools either had less than 20% of teachers using computers in teaching (*N=61*) or had about 80% to 100% of teachers using them (*N=68*).

As indicated in Figure 9, the majority of teachers indicated that they use computers weekly (*N=139*), and this was followed by daily use (*N=47*). Some respondents chose "others" (*N=33*) such as "irregular use," "use when needed," or "depending on the curriculum." The others used computers monthly (*N=16*).

Figure 9: Frequency of Computer Activities in Kindergartens



The schools were divided on the issue of staff development for computer training. Figure 10 shows that slightly more than half of the schools provide such training (*N=130*), while the rest do not. The types of training provided include basic computer operation, word processing, web design, and use of software provided by the computer companies.

Figure 10: Computer Training for Teachers Provided by the Kindergartens

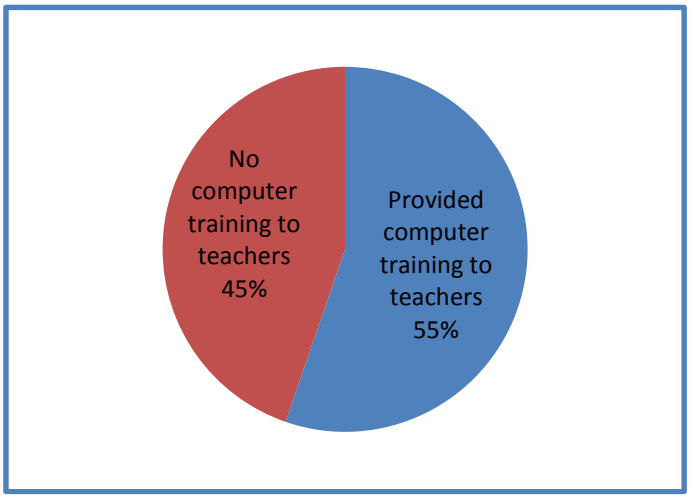


Figure 11 indicates that most of the 235 respondents reported that their schools installed the computers in computer laboratories or centers (*N=182*). The second most frequently chosen location to house the computer is a computer corner in the classroom (*N=99*), followed by the school office (*N=43*).

Figure 11: Location of Computers Installed in Kindergartens

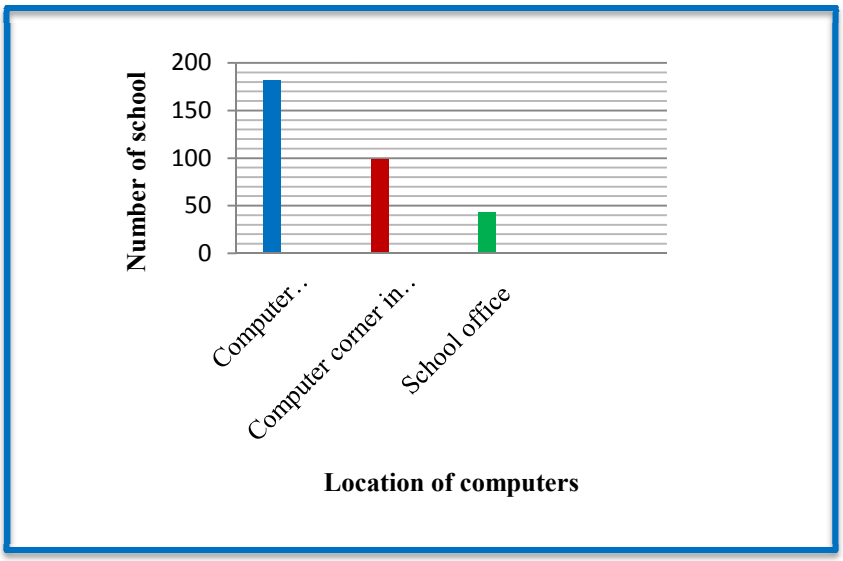


Figure 12: Number of Computers Installed in Computer Laboratories/Centers

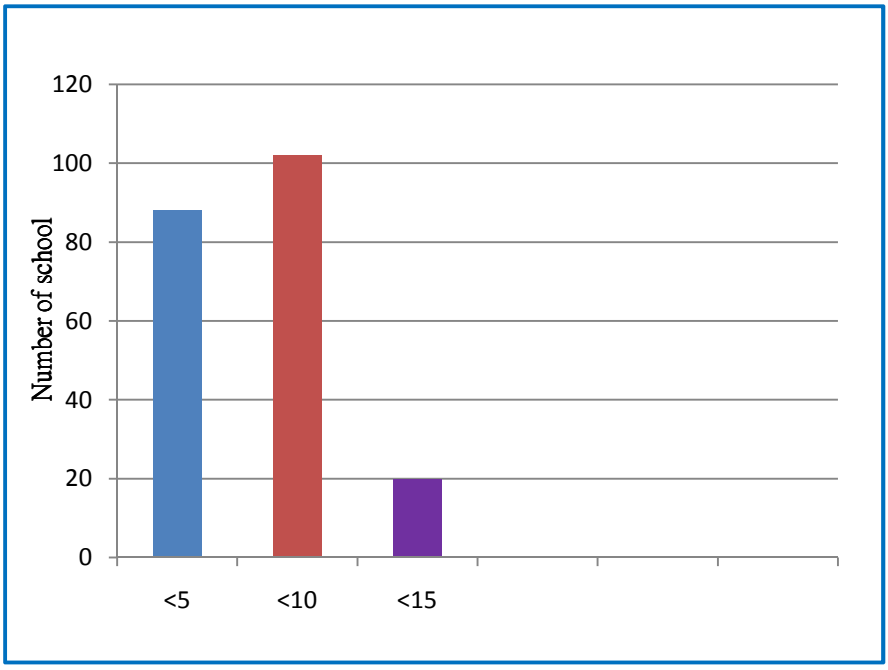
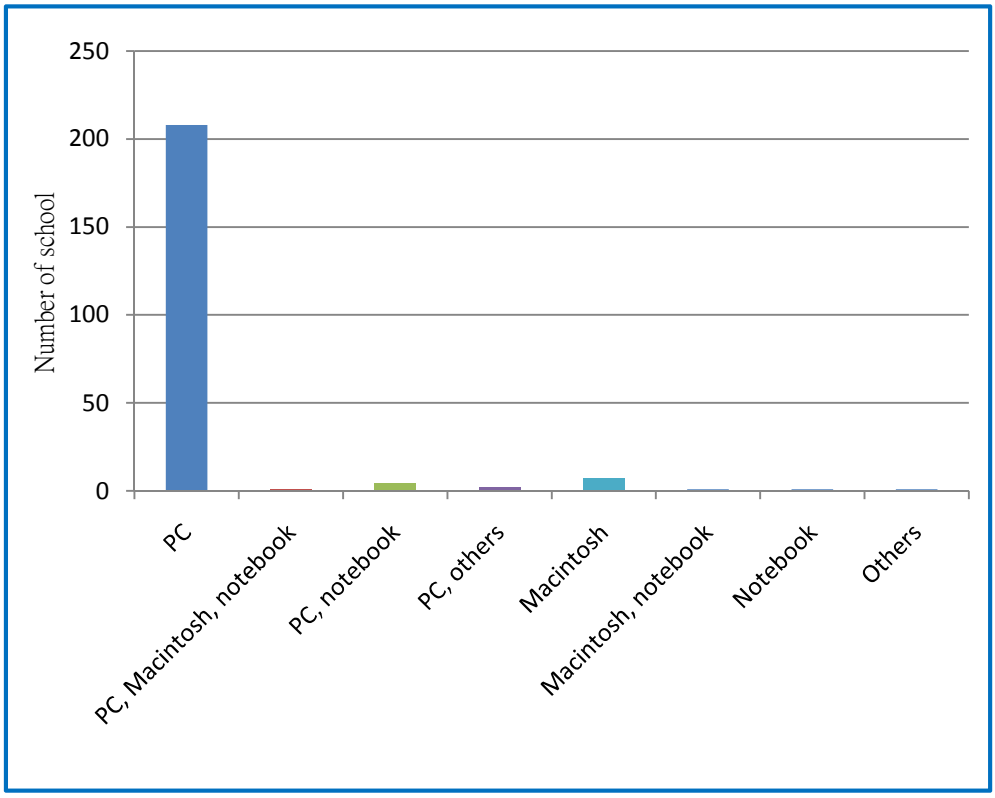


Figure 12 shows that most of the schools have 6 to 10 computers in the centers (*N=104*), followed by less than five computers. Only 19 respondents reported 11 to 15 computers in the school computer laboratories centers, and eight reported more than 15 computers.

As shown in Figure 13, the most popular computer type is the personal computer (PC) (*N=215*), which represents 91.5% of the sample. Macintosh was the second most popular computer type. However, only nine respondents reported that their schools used computers. Nine respondents said their schools had notebooks. Most of the respondents indicated that they used PCs alone (*N=208*), four used PCs along with notebooks, and two used PCs with other types of computers. Seven respondents reported their school used Macintosh only. The other four individuals reported that their

schools used PC with Macintosh and notebook, Macintosh with notebook, notebook only, and other types of computers only.

Figure13: Types of Computers



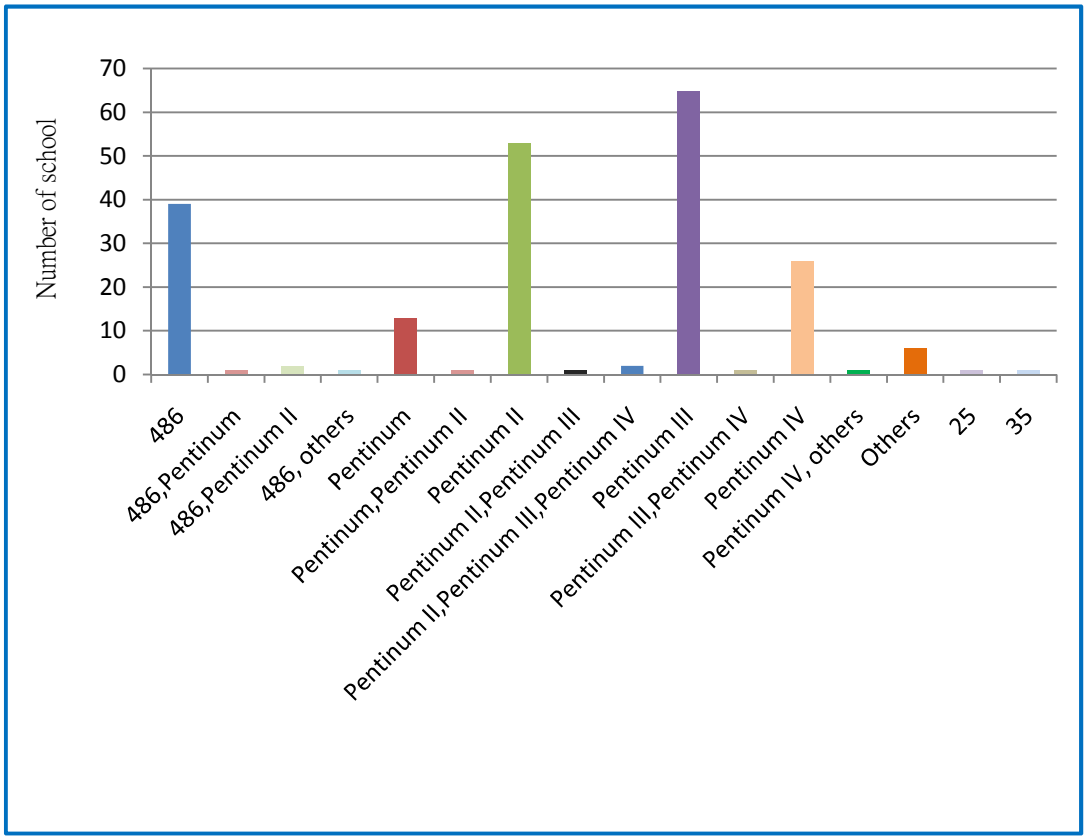
4.1.3 Software and Curriculum

With regard to the specific types of hardware, Figure 14 shows that the two most common systems are Pentium II (*N=60*) and Pentium III (*N=69*). The third commonly used hardware was 486 (*N=43*). A total of 20.4% of respondents reported their schools used Pentium IV (*N=32*) and Pentium I (*N=16*). Some schools used other hardware (*N=8*) including Celeron 1.7 GHz, Intel Celeron 533 MHz, Intel Celeron 633 MHz,

Open Office, Version: Mac OS21 – 9.2.2, and Internet system.

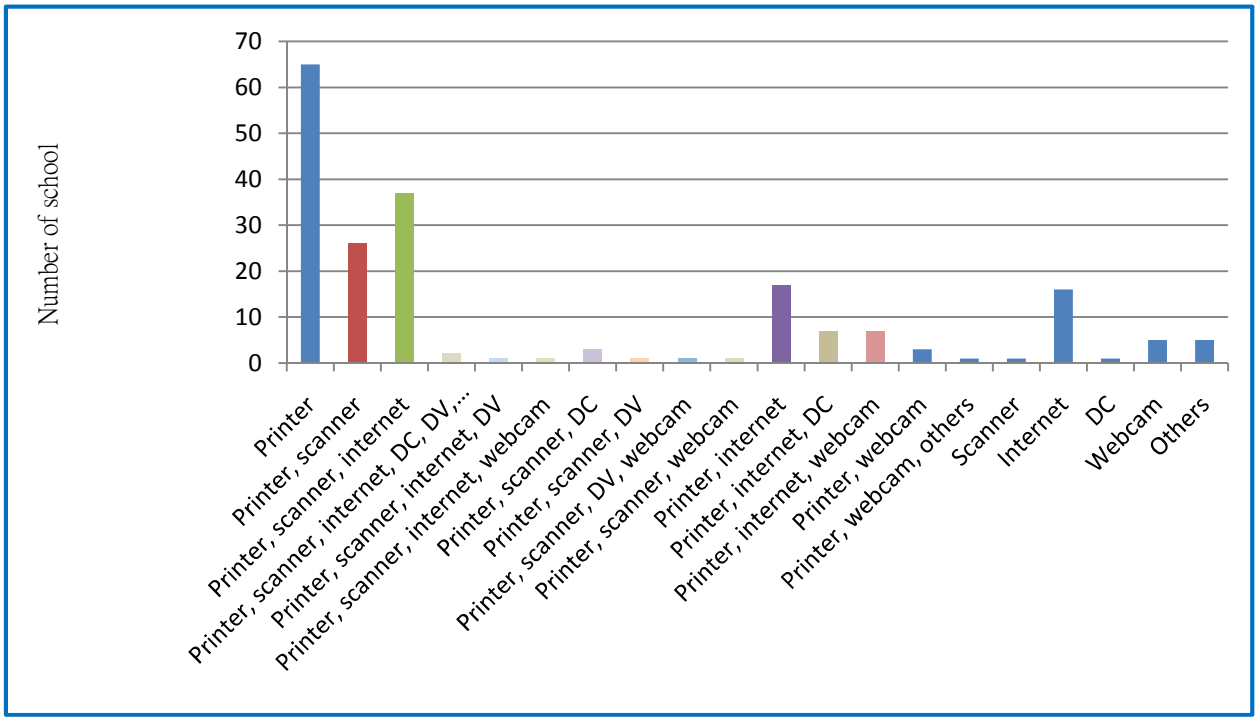
The most commonly used system software was Windows (*N=226*) (*N=91*) followed by Windows 98. One respondent reported that his school used Linux, while the other four reported using other systems including Mac OS9.2, Office 98, 2000, XP, the Intranet, and a customized system developed by a computer company. Eleven of the responses indicated that their schools used Windows, while three used Windows with other systems.

Figure 14: Types of Hardware



As shown in Figure 15, most schools are equipped with printers (*N=178*), and the Internet (*N=92*). Scanners were also commonly installed and used (*N=78*). Web cameras, digital cameras, and digital video cameras were less commonly used, with only 21, 17, and 5 respondents, respectively, reporting that their schools used them. A significant number of respondents reported that their schools were equipped with printers alone (*N=65*). The second most popular combination was printers, scanners, and the Internet (*N=37*). Twenty-six respondents reported their schools used printers and scanners together.

Figure 15: Types of Equipment in the Computer Laboratories/Centers for Children



With regard to input or output devices, the most commonly used device for Chinese input was the Pen Power (*N=75*). Switches were not uncommon (*N=33*). Some schools used joysticks, touch screens, alternative keyboards, remote keyboards, and the wireless mouse. Most of the respondents thought that the chairs in the computer laboratory/center were adjustable to the children's physical needs (*N=151*), while some did not think so (*N=82*).

Figure 16 shows the frequency of using a computer laboratory/center. Most of the children used the facility once a week (*N=116*), a lesser number twice a week (*N=66*). Some respondents reported that the children used the laboratory or center everyday (*N=49*). The others (*N=13*) reported that the times of use were more than once a day, 10 sessions per semester, once weekly or twice weekly during computer lessons, everyday in the computer corner in the classroom, and whenever needed.

Figure 16: Frequency of Using computer Laboratories/Centers

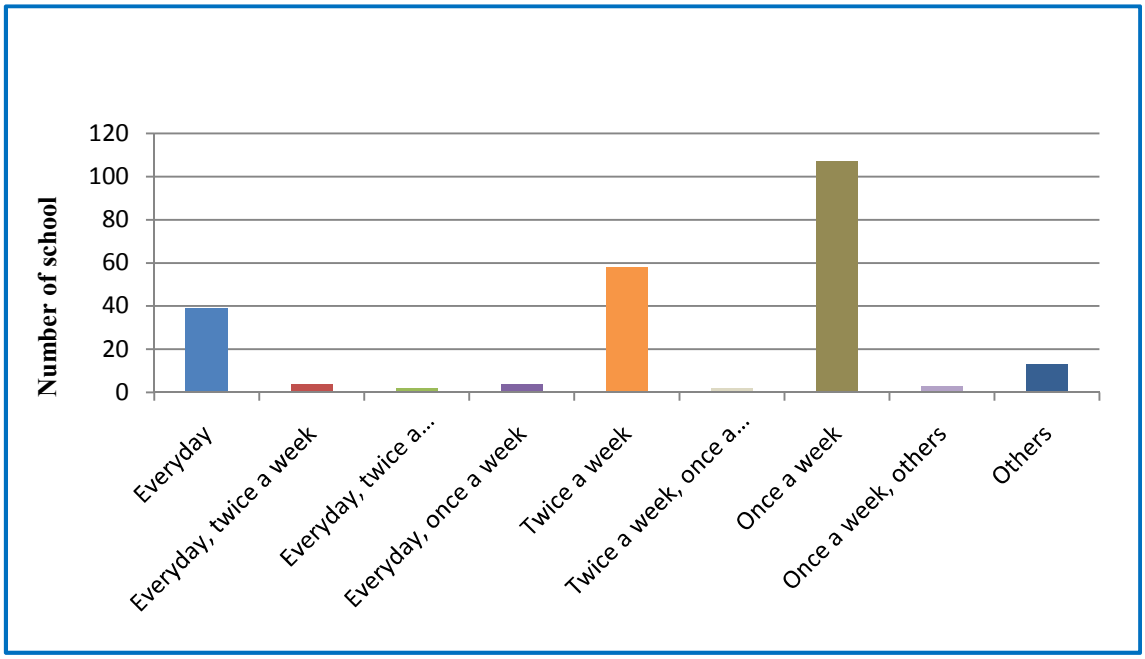
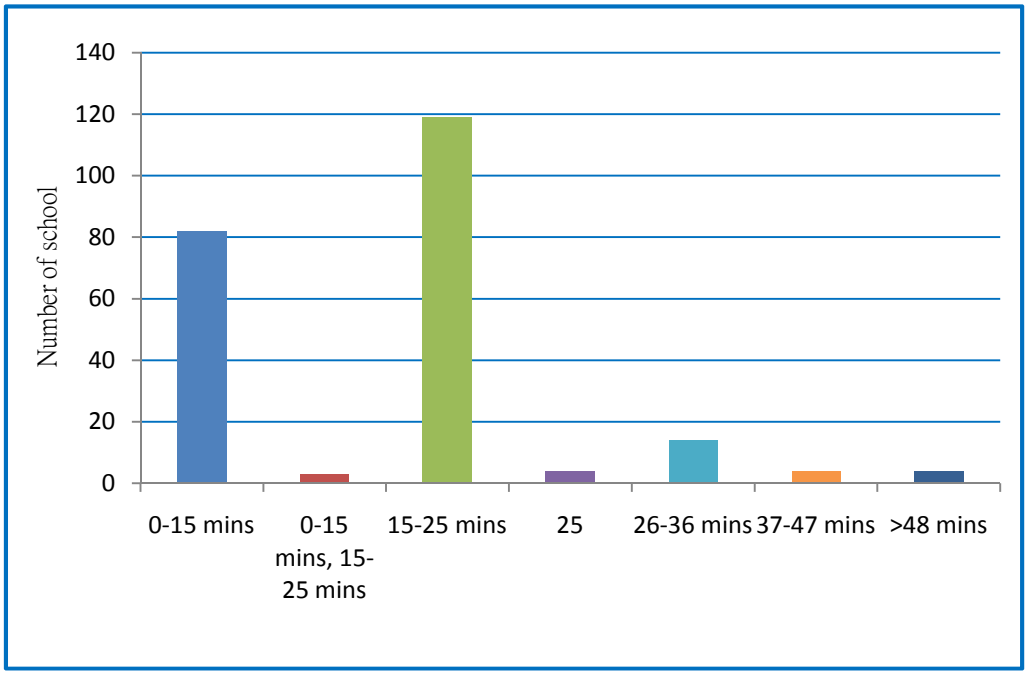


Figure 17 shows the frequency and duration of the computer activities. A great proportion of the respondents reported that the duration of computer activities was shorter than half an hour. More than half of the responses revealed that each session of activity lasted for 15-25 minutes (*N=126*), and more than one-third reported sessions of approximately 15 minutes (*N=85*). For the remaining responses, 15 reported that the duration of activity was 26-36 minutes, three reported 37-47 minutes, and eight reported more than 48 minutes.

Figure 17: Duration of Computer Activities



When working in the computer laboratory/center, most children worked in pairs (*N=162*) or individually (*N=75*). A small number of responses indicated that children played in small groups (*N=14*) and in a whole group context (*N=8*), as shown in Figure 18. Moreover, Figure 19 shows the choices that children make when playing computer activities in classrooms. One hundred twenty schools allowed their children to play with computers during their free play time, while 111 schools did not.

Figure 18: Grouping of Children in Computer Activities

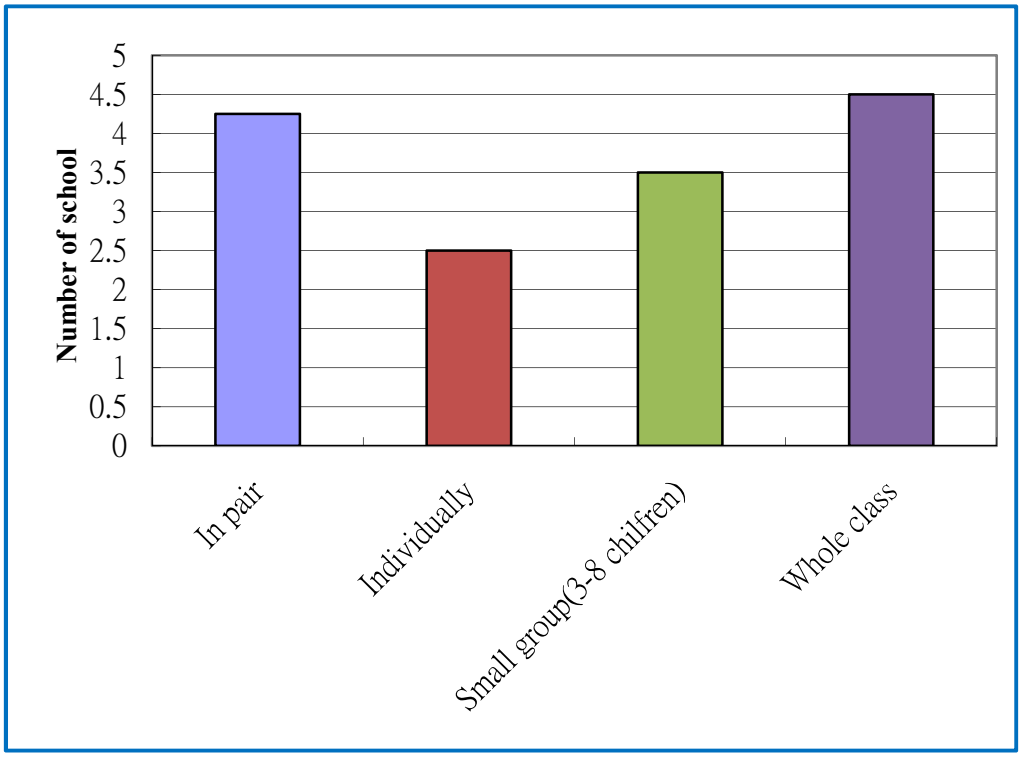


Figure 19: Number of Children Who Are Allowed to Play with Computer Activities at Free Play Time.

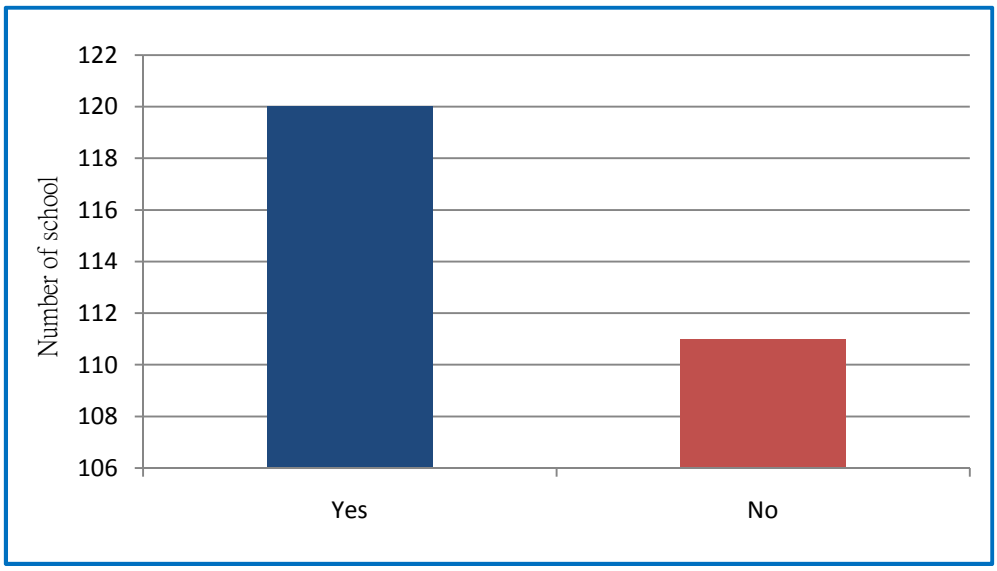


Figure 20: Relevance of Computer Activities to Children's Learning

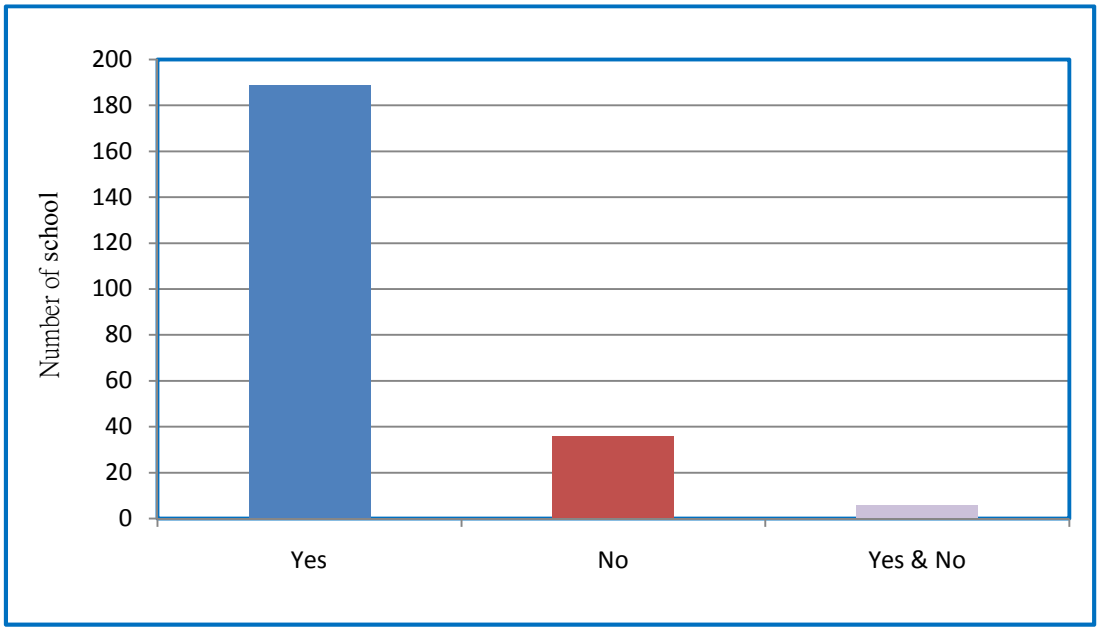
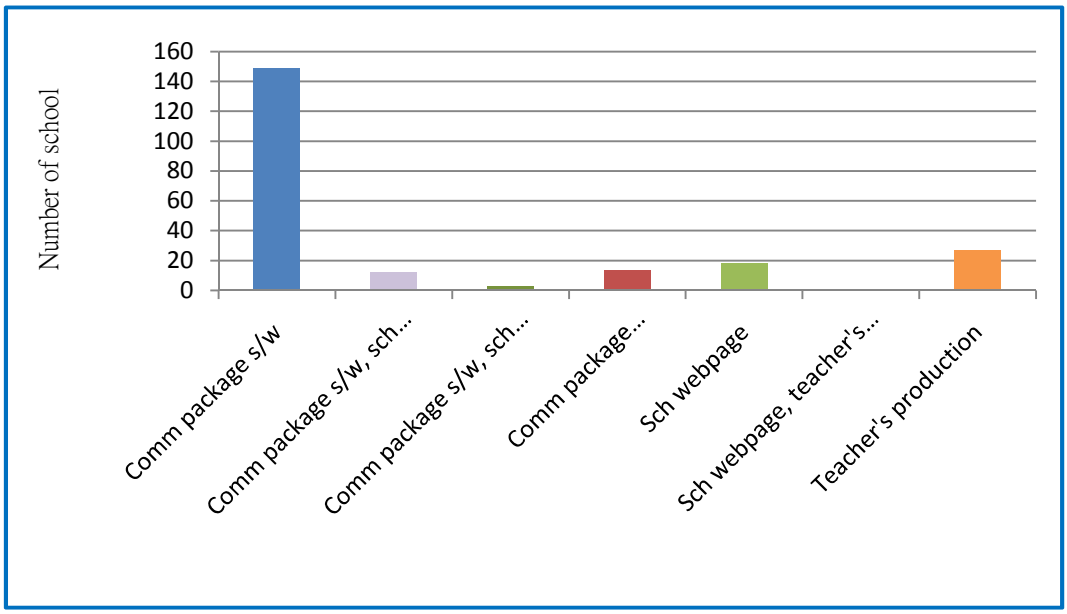


Figure 20 shows the responses to whether the respondents thought that the computer activities are related to children's learning occassionally (*N=189*) or always related to their learning (*N=39*) or not relate to their learning at all (*N=6*). More than half of the school provided computer guidelines for computer activites (*N=123*). About half of the schools (*N=109)* did not provide any curriculum guidelines at all.

Figure 21 indicates the different sources of computer activities provided by the schools. More than half of the schools used commerical packages from the local market (*N=149*), followed by the use of presentation software with tools like PowerPoint (*N=27*). However, some of the schools used both commercial package software and those produced by teachers (*N=14*). Some schools provided Web-based computer activities

directly through their school Web page (*N=18).* Only one school used both the school Web page and the teacher's own presentations. Further, some schools selected computer activities from available commercial packages, the school Web page (*N=12*), and the teacher's own creations as well (*N=3*).

Figure 21: Different Sources of Computer Activities Provided by Schools



The results also indicate that about one-fifth of the schools produced computer portfolios to illustrate children's learning *(N=54).* The majority did not use electronic portfolios *(N=176).* More than half of the schools assessed the children using the children portfolio approach *(N=167),* and only a minority did not *(N=43).*

4.2 Summary

This chapter presented the results obtained from the survey. It described the demographic characteristics and the background of the respondents who provided background information regarding the use of computers in their schools as well as detailed information about their computers. The most significant findings included the following:

- Most of the respondents were from non-profit making kindergartens and located in the New Territories which are the new towns for the growing population.
- The computers were mainly installed in computer laboratories/rooms with personal computers and were shared by all age of children;
- For those respondents that installed computers in computer corners in their classrooms, approximately half of them allowed children to play with the computers there during free play time;
- Most of the respondents provided computers activities for all age group of children from 3 to 6 years of age for at least 3 years. However, the majority of the them only implemented the computers activities weekly for about 15-25 minutes;
- When children played the computers in the computer laboratories/rooms, most of them were encouraged to work in pairs;
- It was mainly the head teachers' responsibility for implementing comptuer activites for the children, but there was only slightly half of them who indicated that they have received computer training about the best way to do this. What

training they had was limited to basic computer operation, word processing, web design and the use of software;

- Most of the teachers used the computer assited teaching once a week;
- Most of the computers of the respondents were less powerful ones and about one third of them were connected to the Internet;
- The most common peripherals provided with computers were printers and scanners. Other new technologies such as web cameras, digital cameras and digital video cameras were less commonly used;
- Most of the respondents indicated that they mainly used computer packages from the local market and therefore, the comptuer activities were related to the children's learning and primarily related to a project they were engaged with.

These significant findings revealed that the nature of the use of computers described by the respondents was basically for playing with activities regarded as appropraite or basic to early childhood curriculum. The main computer settings found were computer laboratries/centers and this had an impact on the frequency and duration of implementing computer activities to the children, since teachers had to plan ahead for their use and this was not always convenient in the busy teaching day. The less powerful computers and limited computer peripharals were another constraint for teachers in providing diverse and rich computer experiences to children that are now possible with the vast growing array of new technologies.

Two other issues are worth mentioning. First the diverse range of responses to some of the questions in the survey. For example, in relation to the number of years they have had computers in the kindergarten, their potential for staff development opportunities and the amount of time spent using the machines for various activities. Moreover, in relation to the basic computer training for teachers there was also a concern expressed that teachers wanted support to design relevant computer activities for themselves to integrate the new technologies into the early childhood curriculum effectively. They thought that this would enable them to personalise learning experiences more effectively.

The next phase of the research was designed to explore how the ICT was used in more detail. Case studies of three kindergartens were conducted to investigate the nature and extent of learning with computers in Hong Kong.

Chapter 5

Case 1: Beachside Kindergarten

Introduction

Beachside Kindergarten is a nonprofit organization located in a large public housing zone on Hong Kong Island. The kindergarten offers nine half-day sessions (six classes in the morning and three classes in the afternoon) and two whole-day sessions. The parents of children who attend the kindergarten are, generally, professionals (that is, accountants, office workers, or business proprietors). The 'upper' kindergarten class has 30 children who are taught by the head teacher (who is responsible for the class) and a teacher aide working with this class during small-group activities, which are usually held in the morning for an hour a day.

The project approach may be said to form the basis of the school's curriculum. The teacher plans projects or themes that have been agreed on by the school as a whole. For the purposes of this study, the topic of focus was the 'Story of the Seven Brothers.' In this story, each of the seven brothers has a different talent, and the moral of the story is that we all need to be aware of our strengths and use them to advantage. The Appendix shows that the planning for this unit included story making, art and craft activities (painting old Chinese costumes and houses), drama (making up an alternative story and

acting it out), language (creating sentences about the story), and music (using wooden sticks to create rhythms).

Illustrations in this chapter are based on the data how the principal, the head teacher, the children, and their parents enact the educational experience in their school context. Besides, this chapter also focuses on how computers and other new technologies are integrated into the mainstream activities in the kindergarten class and on the perspectives of the main stakeholders with regard to the use of ICT for teaching and learning in kindergarten schools in Hong Kong.

As stated in the previous chapter, the data for this narrative were derived from the following sources:

Interview with the principal

Interview with the head teacher

Focus group interviews with 26 kindergarten pupils

Individual interviews with six parents

Observation of teacher and children

Documents such as teaching lesson plans and evaluation, pupils' works, quality of software, and the website of the designed educational platform

5.1 Interview of Principal

The interview took place in the principal's study. The full questionnaire for this interview is provided in Appendix 3.a. The topics for discussion and questions were organized around the following issues, and follow-up questions were asked where clarification was needed or examples should be provided.

5.1.1 Rationale for Using Computers in the Early Childhood Program and the Importance of Professional Development

The principal indicated that, in 1998, they began to realize that ICT was appropriate for use in the early childhood education and they worked with other institutions to secure funding to support the professional development and use of ICT in their kindergarten program. For example, in 1999, the teachers participated in workshops that taught them how to use Microsoft (MS) Word and PowerPoint in the context of their work in early childhood education. Broadly speaking, the principal wanted her teachers to use ICT as a resource for teaching and learning and believed that her staff needed professional development to help them gain competency in their use of ICT. The staff were then expected to apply their newly gained ICT skills when working with kindergarten pupils.

The principal noted the importance of professional development and claimed that it needed to be ongoing. Thus, from 1999, all the teachers participated in the six-month computer training for the MS Office software. The principal believed that the training should result in an increase in the confidence that teachers displayed when using computers in their classrooms. She also advised that the teachers participate in small groups and select the themes for the pupils' learning. This group approach was chosen, because they believed that the teachers could then support each other and cooperate when designing learning activities and these learning activities could then be shared between them.

The rationale for the computer training was, in part, related to the goal of having the teachers become familiar with the types of software; thus, the professional development considered the ways in which pupils would learn from the various pieces of software on the market. The principal selected software that she thought would achieve their educational goals and the pupils' leaning needs. This software was from the West and was only available in the English language. There were only a few items in Chinese that were purchased from Taiwan. As the evaluation was completed after the implementation of the software, the teachers observed the children while they interacted with the computer activities and then evaluated the quality of the software from their own perspective and of the pupils. The principal noted that the supplier provided her with software that was age-appropriate; however, it was quite difficult for the pupils to use due to their limited language/English skills compared to their native-English-speaking contemporaries, which means that it was difficult to cover the content of the software in kindergarten classes in Hong Kong.

5.1.2 Teaching and Learning with Computers in Kindergarten Classrooms

The principal expressed that in this digital age, ICT is important for the pupils. Children learn through manipulation and exploration, and thus, these factors need to be incorporated into computer activities such that pupils can collect information for better understanding in real-life applications. For example, to help the pupils with the concept of 'food,' the pupils browsed the websites of different supermarkets during a small-group activity, learning about how food is categorized and stored. However, the principal thinks computer-based learning should only occur after the pupils have experienced the ideas in real life. Children can extend their learning on the computer but it should not be the primary source of learning that they encounter in relation to a particular concept.

The principal believed that nursery pupils are very young to play with computers, except as an extended activity. In Hong Kong, the Quality Education Fund (QEF) of the Hong Kong Education Bureau provided a full set of activities and analyzed the educational software that will assist kindergarten pupils. QEF recommended appropriate ways of dividing the activities based on the age groups of the pupils. The teachers then selected appropriate software for themes according to the pupils' interests and abilities. Then, the kindergarten pupils began to build their database of computer activities, which will be incorporated into the thematic activities.

Furthermore, in 2002, two computers were installed in each classroom, and a computer

room was set up, which would be shared by all the classes in kindergarten (see Appendix 5.a.for a floor plan of the classroom). When teachers purposely incorporated the holistic view of learning, they selected software whose theme was related to the pupils' small-group activity in the computer room. However, the pupils played in the computer corner with their own choice of software during their free play time.

In addition, the principal indicated that they used an educational software plan in collaboration with the computer company EVI Services Limited, which provides a web-based educational platform (www.evi.com.hk) to support ICT learning in the early years for all networked computers in kindergarten. The company designed activities that were aligned with the themes that are commonly studied in Hong Kong kindergarten programs. They included various teaching and learning resources such as photographs, video clips, games, and hyperlinks, which were all designed to facilitate the pupils' learning and provide resources for teachers in preparing their lessons. To access the system, each teacher logs in with the user name and password provided. The pupils then work on the platform, where they can store, print, and save their work accordingly.

The platform is web-based; parents can also access it through their home computer if they subscribe to the scheme and thus play with the activities on the platform with their children in their home environment. About 20% of the parents with computers at home have joined the system. It provides a good source of information and communication for parents so that they can better understand their children's school life and assist them with their learning. For example, teachers upload the edited video clips, photographs,

and the pupils' work onto the platform. Significantly, the kindergarten can upload parents' newsletters and notices on the platform, which is a great convenience for working parents who can then read the notices whenever they have access to the Internet.

At the beginning of each school year, EVI introduces the latest developments and the new content of the platform. At the end of the school year, the company collects feedback from the parents by sending a questionnaire with regard to their use of the platform for future improvement. For new parents, the kindergarten invites the company to introduce the function and advantages of the platform during the parents' orientation meeting held at the beginning of each school year. The principal revealed that the parents are, in general, positive in their comments about the use of the system.

The principal shared that she uses the computer not only for presentations during parents' and staff meetings but also for school reports. She accesses the Internet daily after work to check school emails and collect various teaching materials. She felt that the additional features such as sounds and visual effects enhanced the learning opportunities for the pupils.

5.1.3 Summary

The interview with the principal revealed that she was in favor of using ICT in her school and that she encouraged the teachers to participate in professional development so that the process would be facilitated. She noted that it was difficult to find software that is appropriate to the Hong Kong context, where the primary language is Chinese. To utilize the equipment in school, she decided to join a Hong Kong-based venture called EVI, which enabled her teachers to incorporate Chinese-language activities on computers into their lessons. Parents with computers at home joined the scheme and reported that this approach made them feel more connected to the kindergarten and their children's learning.

Thus, there was a realization of the role of ICT in children's lives and an active support by the principal for the teachers to use ICT as an additional resource to enrich the teaching and learning contexts.

5.2 Interview of Head Teacher

The interview with the head teacher Miss Yen took place in the meeting room of the Teacher Education Institute on the day she attended the class for further training. The full interview questions are provided in Appendix 3.d.

Miss Yen has been teaching for more than 10 years. She received her basic qualified

kindergarten certification in Hong Kong and was then studying for a higher certificate training course at the Hong Kong Institute of Education. She joined Beachside Kindergarten in 1999 as the head teacher, although she was previously a supervisor of another kindergarten. She is the sole teacher in a K.3 class with 27 pupils. She has a teaching assistant for one hour during small-group activities, which takes place in the morning. She initially learned about using computers for educational purposes from workshops as part of the professional development sessions from QEF in 1999; however, she did not participate in the computer training workshops, which continued even after the funded project ceased.

5.2.1 The Relevance of ICT in ECE

Miss Yen thought that pupils were much more interested in learning when they can use computers and that using computers was good because it enabled her to cater to the needs and interests of diverse learners. For example, pupils with learning difficulties were able to concentrate more effectively on computer tasks, whereas learners who were regarded as ‘strong’ were able to focus on their work and find out more information easily using the computers and the Internet. She believed that children learn how to access and search information on the Internet at home, which provides them a significant learning skill. The brightness and color of the computer screens were attractive to the pupils, and the programs motivated them to complete the tasks set in the

classroom. However, she noted that she did not use computer activities as the main focus of her lessons but as a resource to catch the interest of the pupils and meet her teaching objectives. Most of the software comprised drills and practices in typing, and she was not in favor of always using this type of activity because she wanted the pupils to interact with the software in a manner that allowed them to choose the direction that their work might go.

5.2.2 Using a Design-based Computer Platform

As indicated in the interview with the principal, this kindergarten participated in the development of a web-based educational platform that was incorporated into their program. Miss Yen said that the activities were useful, because they were all networked in both the computer room and computer corner in the classroom. She was able to give feedback to the pupils about their work, along with suggestions about the content of the themed learning, and to the computer company such that the integration of the activities will be enhanced for future use. Miss Yen agreed with the principal that parents who joined the platform scheme were able to play with the activities with their children at home, thus increasing the interaction between the parents and the children. However, she noted that it was important for her to decide which software was appropriate for use. She also sought the opinion of the parents since the children will use the software at home and they need to be supervised during the activity.

During the class observation for this study, Miss Yen used some of the activities from the platform that were designed for the project about autumn. One of the activities was related to having a barbeque activity in the park—an activity observed by several people in Hong Kong during autumn. It was observed that the pupils shared their experiences on the platform by completing the activities; for example, they were required to select the appropriate objects in making a BBQ such charcoal. Miss Yen recorded some of the pupils' activities and uploaded the photographs, edited videos, and the pupils' work on the platform for both the children and their parents' viewing in school and at home. Therefore, all these edited information was shared as digital resources for the documenting of the pupils' learning in school.

5.2.3 Teaching and Learning with ICT

There are two computers in the computer corner in each upper kindergarten classroom, whereas there is only one computer in the corner of the Nursery and Lower Kindergarten classrooms. Nursery pupils started their ICT experience by using the mouse of the computer in the second semester. When the teacher felt that they were already adept, they could move on to using a range of programs. Based on the floor plan of the classroom, there are a projector and a screen installed in the classroom (see Appendix 6.a. for the floor plan), and Miss Yen used these projectors and screens for group activities. For example, in the 'Seven Brothers' project, Miss Yen produced an

electronic story by scanning the storybook and converting it into a PowerPoint presentation, which she read through with the pupils in the group activity. The pupils were very involved and read the story aloud in class. Miss Yen asked questions about the story, and the pupils all answered correctly. However, there was no other equipment in the computer corner, such as a printer or a scanner. Thus, Miss Yen can only extend their activities in the computer rooms. Every Tuesday, the pupils have their computer activities in small groups in the Computer Room for 15 minutes each. Miss Yen also gives other activities that used computers, such as collecting information from the Internet; these activities took place on Mondays, Wednesdays, and Fridays. Furthermore, Miss Yen noted that it was important that she decides on which software was appropriate for the pupils to use.

The school does not set policies or restrictions with regard to the requirements of computer activities; thus, the teachers were given the freedom to select the activities on the platform and design the extended activities according to the pupils' needs and the teaching objectives. Thus, in their classroom practice, the pupils were allowed to play with the computer during their free play time only after they have completed the class work. However, Miss Yen wanted to ensure all pupils had a turn to play with the computer; therefore, she turned on the computer each morning, that is, before the school bell rings, such that pupils who work at a slower pace in the compulsory class work during small-group activities can have their turn. Moreover, all computers in the classrooms were connected to the Internet, and Miss Yen integrated activities that use the Internet, such as collecting information on the project works.

There were 27 children in the class; thus, there was a timer in the computer corner, which limits the play time limit for each pupil to around 3–4 minutes. The pupils then take turns according to their interests during their free play time. They queued at the corner and turned the funnel over to set a starting time for their turn. Miss Yen observed that the pupils behaved and were well disciplined when taking turns. The pupils interacted with their peers who were playing or those who were queuing for a turn about the content of activities. Although the pupils expressed that the time was very short for playing with the computer, the learning process was positive in terms of the pupils' social, cooperation, and problem-solving skills. Moreover, there were few pupil who exceeded the time limit, but they finally followed the rule after their peers or Miss Yen reminded them. Nevertheless, the pupils were, in general, cooperative and involved in the group tasks that their teachers designed. They negotiated and collaborated with other peers in the group and presented their ideas and learning outcomes with a task sheet. Sometimes, the pupils recorded presentations using single words or pictures, where the more capable pupils help their peers in describing. This approach provided an opportunity for Miss Yen to understand the social development of the pupils by observing who were able to guide and lead their peers and who were more reluctant in sharing ideas and turns.

The kindergarten encouraged teachers to fully utilize the equipment in school; thus, teachers were requested to produce two to four multimedia resources each year to align with their teaching themes. Hence, after three years, the teachers had generated more

multimedia resources for the kindergarten. Teachers who taught the same age group of pupils discuss their teaching plans as a preparation and selected multimedia resources that they considered to be relevant. After implementation, the teachers provided comments on the resources that they thought were beneficial for learning. Furthermore, they also selected software from QEF in 1999 that they believed would help consolidate the pupils' learning or skills. The software was evaluated after the activities were implemented, and the teachers used the evaluation form that the project leader designed. All teachers believed the pupils were more interested if the activities were implemented with computers, because this medium seemed to catch their interest.

5.2.4 Professional Development on ICT

According to Miss Yen, the computer closely relates to everybody's daily life and not just the teachers'. She regarded the computer important, because it helps teachers work more efficiently; for example, she communicated with parents on the EVI platform by uploading parent notices once a week. Thus, parents who do not pick their children up from school (and thus do not attend the school on a regular basis) can read the notice posted on the platform. Significantly, Miss Yen can also produce teaching materials and print them out directly from the computer. In addition, she can enlarge the images when using the projector so that the pupils can see them more clearly. These projected images would be accompanied by direct focused teaching instructions.

Miss Yen noted that she used the computer in her classroom to prepare teaching materials, search information on the Internet, and stay in touch with her colleagues through email. She also indicated that she uses the computer every day to type lesson plans using MS Word and was learning how to incorporate digital images into the teaching materials. In general, Miss Yen found the teaching and learning experiences using ICT positive, but she was concerned about the high level of technical problems that she experienced as part of her daily teaching routine when she used these ICTs. It was particularly difficult for her to handle problems while she was teaching with small groups.

5.2.5 Summary

Miss Yen considered that ICT was important to the work of kindergarten teachers and made the work of teachers more effective, because the Internet, computers, and other peripherals were available for preparing teaching content such as the creation of multimedia teaching materials. She also regarded it as beneficial for pupils, because it enhanced their attention span and enabled them to practice thinking skills through the combination of visual and audio effects. She emphasized that the software and activities on the educational platform had to be interactive and interesting to the pupils. Thus, she gave feedback to the EVI computer company on a regular basis so that they can incorporate the suggestions and modify the software accordingly to enhance the quality

of teaching and learning with the resources on the platform.

Furthermore, she maximized the use of ICT in her communications with parents who were working full time and cannot attend school activities on a regular basis. To ensure the quality of teaching and learning, the school requested her to evaluate the software and activities with the evaluation tool from QEF, along with other teachers and their pupils.

5.3 Interviews of Parents

Six parents participated in the individual phone interviews. Most of them were working; thus, they selected the schedule of the interview according to their availability. Each interview took about 30 minutes. The full interview questions are provided in Appendix 3

5.3.1 Parent 1

Parent 1 has two daughters—the younger daughter attended Beachside Kindergarten, whereas the elder one was in primary school. Parent 1 believed that computers are tools for communication that can help enhance the interpersonal skill*s* of children. She

thought that it was important for kindergarten pupils to be exposed and learn different things; for example, learning to communicate effectively in their early years. She believed that computers provide more knowledge and information in advance to pupils and when pupils learn basic computer literacy skills, they will not be isolated by the society when they grow up. She said that ICT affects the pupils' daily lives by making their lives more interesting and relevant. Thus, she believed in using computer*s* for her children's learning and leisure. She encourages her daughters to revise their daily work both through the computer through the various games that they have and by reviewing the examples in their workbooks. She believed that it was good to give pupils a time limit in using the computer, because otherwise, they would prefer to be on the computer for most of the time, which she felt would be detrimental to their overall performance in school. During weekly family days, pupils go out, sometimes visiting the islands. She has not joined the educational platform of Beachside Kindergarten, but she has joined the platform of her elder daughter, who attended another primary school similar to Beachside Kindergarten.

5.3.2 Parent 2

Parent 2 has one daughter and one son. The daughter attended the Beachside Kindergarten, and the son was in primary school. She agreed that her daughter should work with computers in Beachside Kindergarten but felt that it should not exceed 30

minutes per session. *S*he worried that extensive use would be detrimental to her daughter's eyesight. She also joined the educational platform at an earlier stage compared to other students but had since suspended it. She said that Beachside Kindergarten has not explained the rationale of providing computer activities, but she commented that the platform had incorporated different themes of learning with the activities, such as stories. However, she thought that her daughter has already worked on the same platform in school; therefore, she was not interested in having her play the platform again at home. Furthermore, she seldom accesses the Internet at home and only allows her daughter to play with the computer once or twice a month for 30 minutes to one hour and usually only during school holidays. She said that they had strict rules such that her daughter can only search using the Internet when an adult is present, although she also sometimes plays games on the computer with her brother. When browsing websites with her father, they are always related to school work, such as checking the primary school guidelines. Her daughter does not mind this activity, because she is interested in other activities such as drawing, singing, reading story books, going to the park, and playing children's games with her friends outside.

5.3.3 Parent 3

Parent 3 had one son who was enrolled at Beachside Kindergarten. She believed that the use of computers could help facilitate children's thinking but worried that children

might become very absorbed with computers and would not want to do other things. She thought it would be appropriate for children to use computers for their learning needs in school. She has not joined the educational platform scheme at Beachside Kindergarten, but her son often browsed other educational platforms with his father on the Internet to access information. At home, she allowed her son to work with the computer for 45 minutes a day, followed by browsing on the websites for fun. She thought that information technology plays a significant role in their daily life. For example, in the past, she had to search information by visiting the sites or making telephone inquiries, but now, the Internet has saved her a considerable amount of time. During the school holidays, her son frequently browses websites and plays online games.

When they first had a computer, she said that she often played computer games with her son, but soon, he mainly played by himself. On some occasions, however, his cousin would play with him, which she thought was good because when he got stuck, his cousin can help him out. Nonetheless, she limits the time spent on some online games. Her son likes to play computer games and listen to children's songs online. She noted that he is very involved when he plays with the computer and sometimes teaches his father how to play computer games. He likes to stay in his grandmother's home with his cousin and play with the computer rather than attend any other extracurricular activities. Thus, during summer breaks, the family usually moves to her sister's place so that her son can join the summer activities with his cousin to build his confidence. She hopes that her son can learn from his interests and develop his social skills this way.

5.3.4 Parent 4

Parent 4 asserted that computers are developing rapidly and it is important for children to be familiar with them. She thinks that we can get whatever we want and learn from computers. She also believes that computers provide several opportunities for children to learn new things by browsing the websites and by playing with educational software; however, she seldom uses the computer in her daily life. She thinks that the computer is attractive to her daughter because of its colorful visuals and various sound effects. She purchased simple educational software related to her daughter's interest in coloring and in learning English. She noted that she needed to control the time that her daughter spent on the computer, because if she used it too much, it would be detrimental to her eyesight. She does not allow her daughter to play computer games, worrying that she will become addicted to them and then will not be willing to complete her home work. However, she felt that this was not a problem in her case, because her daughter was more interested in reading story books than using the computer.

5.3.5 Parent 5

Parent 5 also agreed that the computer is very popular nowadays and thus had a

computer installed at home. She browses websites with her son and searches for different pieces of information, including school work. She thinks that children can easily learn how they can browse for information on the Internet. She joined the school plan on the use of the educational platform of EVI at Beachside Kindergarten from the beginning, because she wanted to learn more and teach her son, but she commented that the activities on the platform were very superficial and easy for him. Her son was raised by another family when he was in kindergarten. He used to play fighting games with his peers and also played the same games at home every day. Although he thought that he had learned computer skills in school, he did not really have much opportunity to play with the computer there. He often searched the Internet to play computer games by himself, although sometimes with the assistance of his parents, for example, for bookmarking his favorite websites. However, she observed that her son did not play on each website for a long time, that is, only for 10–15 minutes on a regular basis. They imposed a time limit of 1 hour on these activities. She felt that her son has increased his vocabulary since using the computer, which was helpful in her son's transition from kindergarten to primary school, because in primary school, he will be required to learn vocabulary from the website that the school provided. Parent 5 thus bought educational software to help her son learn English, because he liked playing the language-game software. She said that computer affected her daily life quite a lot, particularly in terms of communication with others.

5.3.6 Parent 6

Parent 6 had one daughter who attended Beachside Kindergarten. She has not joined the educational platform scheme with EVI, because she was afraid that her daughter will become addicted to computers. In her opinion, it was more appropriate for young children to be exposed to computers to learn new things in the upper kindergarten levels. She viewed computers as being important to children, because computer literacy was emphasized in their primary school. They were also required to be familiar with the technology, for example, by knowing the hardware and recognizing different parts of the computer and their names, such as the monitor, keyboard, and mouse. She believed that the computer literacy her daughter learned at Beachside Kindergarten benefited her in the transition to primary school. Her daughter has been exposed to computers since she was in upper kindergarten. Her husband was an IT expert and always used the computer at home; therefore, her daughter also played games and searched information at home by herself or, sometimes, with her parents. Her daughter could search online games from the Internet, and her classmates shared websites of such games, which she enjoyed immensely. However, she only let her daughter play online games during school holidays or after the school examination period for one to two times a week. She explained that most children only learn how to play online fighting games and were happy to fight but learn nothing from them. In contrast, her daughter learned new things by answering the questions in various quiz games that she played. She displayed the same learning attitude when she played with the computer and other activities such as drawing, painting, and singing.

5.3.7 Summary

The parents in the interviews generally agreed that computers and technology are popular and important for children to use in this century. They considered it important that their children become computer literate as they are transitioning to the primary school. They all provided encouragement for their children to interact with computers in school and thought that the educational platform provided by Beachside Kindergarten will enhance their children's learning. Yet, they also worried that their children might become addicted to using computers and thus restricted the time that they allowed them to stay on the computer. Thus, most of them did not feel the need to join the educational platform scheme at home. Rather, they allowed their children to play with educational software and explore websites under their supervision at home, particularly during school holidays.

5.4 Interviews of Children

There were 28 children in the K.3 class of Beachside Kindergarten, 26 of whom participated in the research work. The interview took place in the Beachside's computer center. The pupils were interviewed in four small groups of five or six in a semi-structured interview session, where they completed a drawing that represented their understanding of computers at the end of the session. The interviews were videotaped for analysis and averaged a total of 30 minutes. The following questions were asked of the groups:

Can you draw a computer for me that shows all the different parts? Tell me how they work.

Do you like to go to school? Why?

What do you learn in school?

What kinds of activities in class do you like most? Why?

Are there any activities that you don't like? Why?

Do you like computer activities in class?

What do you play with the computer activities?

What kind of computer activities you like most?

Are there any computer activities you don't like?

Do you like to play computer activities with friends?

Do you think computers help you learn? How?

Do you have a computer at home?

How often do you play with the computer at home?

Do you use the computer at home by yourself or with friends and/or family?

Who taught you how to play with the computer?

5.4.1 Group 1

There were five children in the first group, which included two boys and three girls. The interview revealed the following broad patterns of their use and attitude toward the use of computers in school and at home.

1. Four of the five children had a computer at home, and they were usually allowed to play with it once they had completed their homework or during school holidays. For example, one child said that her mother made a record sheet to limit her playing time on the computer. She was not allowed to go over 15 minutes because her mother said it would not be healthy for her eyes. Another child echoed that he had a record sheet; however, he was allowed to play for 30 minutes.

2. Most of the group members shared the computer with other siblings and usually agreed to take turns in doing this.

3. Some group members said they learned to use the computer by themselves, whereas others indicated that their father had taught them. One member indicated that he learned using the computer from the manual.

4. The group reported that they thought the computer was fun for playing games, browsing the EVI website, writing words, and drawing with the Paint Brush software, but they did not think that it helped them learn their school work better. Although they liked playing games, one of the girls said that the 'death' game was cruel, and one boy said that he thought that the Superman game was very violent. One child advised that, in addition to playing games, they should also be allowed to use the computer to upload photographs at home so that they could view them on screen.

5. Three of the group members said they enjoyed going to school because all children go to school to learn and play and there are computer games. However, one said he does not like school because the writing activities are very hard for him. Two of the group members said they like physical play, whereas one likes the home corner. The group members were mixed in their response about whether they liked playing alone or in pairs.

At the beginning of the interview, the group members were requested to draw a computer with different parts and explained how the parts work. Individual drawings with explanations are shown in Appendix 6.a. The drawings revealed that these five- or six-year-old pupils had good understanding of the various components of a computer. For example, Child 1 introduced her drawings by sharing that she used the mouse to draw through the Paint Brush software, for example, and she liked drawing rainbows. In her drawing, she named the computer incorrectly as the monitor and drew a stand that supported the computer.

Child 2 explained that the rectangular object in her drawing was a keyboard, which is used for typing. She also said that the circle represents the mouse, which can be used by clicking it, and she can pick objects by clicking the mouse twice. The square with three flowers is the computer screen.

Child 3 also drew two speakers and explained that they were for listening to music, although he did not name them correctly. A mouse was drawn next to the keyboard, and two numbers, that is, 6 and 7, were written to represent the row of numbers on top of the keyboard.

Child 4 drew a keyboard at the bottom of the picture and a mouse that was linked from the right bottom corner of the computer. An orange box next to the mouse was the hard disk, which was used to switch on the computer, as Child 4 explained. Child 4 also drew

images on the screen.

Child 5 highlighted a rectangular box, which was the part used to switch on the computer, although she was not able to assign a name to this part. She also drew a keyboard under the computer stand and explained that there were two images drawn on the screen.

5.4.2 Group 2

There were six children in this group (three boys and three girls). It was evident that this group of pupils had very similar experiences and attitudes compared to the first group.

1. Four of the six group members reported that they had computers at home—two of them can play the computer after finishing their homework, whereas one of them can play the computer after the revision, and the remaining one said he can play only when accompanied by the father. Two of them did not indicate whether they had computer at home. Three group members said that they learned using the computer from their aunt or father or by himself/herself, and three did not respond. One group member played the computer with his father, mother, and brother, another one played alone, and one said that s/he had been taught by her/his aunt, whereas three group members did not answer

this question. Three of them responded that they enjoyed playing with other children when they played with the computer.

2. In terms of nominating their favorite computer games, two said they liked Barbie for either changing clothes or feeding the baby, one liked Paint Brush for drawing snowman, and three group members did not answer. Two of them did not like the computer game Mathematics. One disliked the 'Hello Kitty' game in the website, because it was not interactive at all. One group member disliked the 'Drawing' game, because he/she thought it was not his/her real drawing. The other group member disliked Pinball and Painting, because they were not 'fun, whereas one group member liked all computer games.

3. Four group members liked going to school, because they thought that it was fun and there was much to learn, such as writing, playing, and learning English. Four group members said they can learn writing and online or traffic light games in the computer.

4. In terms of their favorite activity in school, two group members liked art and craft, because they liked to make different things. Two group members liked stories, whereas one group member liked physical play because it was healthy. Three out of the six group members reported that they liked all school activities. One group member did not like physical play because it was very crowded, whereas another group member did not like art and craft because it was messy to use the glue and preferred riding the bicycle at

home. Again, at the beginning of the interview, the group members were requested to draw a computer with different parts and explain how the parts work. Their drawings are included in Appendix 7.b. It was evident that these young children could do this task effectively.

Child 1 explained that the numbers 1 to 10 that he drew on the keyboard were for calculation, although he could not name the keyboard. He indicated that there were also buttons on the keyboard without either numbers or letters. The symbols '+' and '-'on the computer screen of the drawings were for adjusting the volume. He drew a mouse next to the computer but did not mention it.

Child 2 wrote two Chinese characters on top of the computer and said that it was the brand name of the computer. She drew a keyboard but could not name it. She explained that the images were drawn on the computer screen. There was a mouse in the picture, which was linked to the computer, but she did not mention it.

Child 3 explained that some images were drawn on the computer screen. He drew two speakers, which were placed on each side of the computer, and a mouse was linked from the corner of the computer. He did not explain what the rectangular object was and could name only the screen.

Child 4, like Child 3, drew two speakers on the sides of the computer, one of which was

for adjusting the volume and another was for listening. She drew a keyboard with the letters ‘A’ to ‘N,’ in ascending order, but she could not name it. She also drew a mouse that was linked from the corner of the computer, which she said was for clicking something and named it correctly. She also drew a printer, although she thought it was a photocopier.

Child 5 drew some buttons on the keyboard with letters ‘A’ to ‘P,’ in ascending order, but could not name them. However, he said the buttons were for pressing.

Child 6 drew a frame in purple and explained that it was a computer screen. There was a cross at the upper right corner of the screen, although she did not explain it. She named the red box next to the computer as a speaker, but the other red box was a timer for counting the time for each turn of the player. She also drew a keyboard with the numbers 1–7 on the buttons but could not name the keyboard. A hard disk was also found in her picture, but she did not explain nor name it. However, she drew and named a mouse linked from the corner of the computer.

5.4.3 Group 3

There were five children in this group, including two girls and three boys. It was evident that this group of pupils had very similar experiences and attitudes compared to the first two groups.

1. In this group, all members showed that they had computers at home. However, there were restrictions from their parents with regard to their use of the computer. One group member reported that his mother allowed him to play the computer after examination. One group member said that she can play the computer if she has free time after doing her homework. Another group member had to get permission from his mother after doing his homework and revision, and another one can play with the computer after the Easter holiday. One group member said he played with the computer alone after his brother had finished playing with it, whereas two group members let their little brothers play after finishing their favorite games.

2. In terms of their enjoyment of school, the group had generally favorable opinions. One group member liked going to school, because she was happy when the teacher taught her how to write. One group member liked going to school because everyone went to school. Another group member liked to go to school because of her teacher's manner of teaching, of playing games, and he would be alone at home once his/her brother had gone to school. One group member expressed that he did not really like going to school, because the words were very difficult to learn. One group member thought that the computer was for fun and Internet browsing, whereas another group member found that there was nothing to learn from the computer.

3. Regarding computer games, four of the group members agreed that they disliked the 'Pinball' game, because once the ball fell down, the game would be over, which was too fast. One group member replied that she disliked the basketball game, because she was always losing.

4. Two group members said that physical play was their favorite activity in school, because their brothers also liked it, whereas one group member liked 'Home Corner,' because cooking was fun. One group member did not like 'Home Corner' in school, and the rest had no response. One group member learned using the computer from his father, another group member learned by himself, one group member learned by self-studying the manual, and two group members did not answer. However, one group member liked playing the computer with other children, another group member said he sometimes did, but one group member preferred playing alone and had more fun.

At the beginning of the interview, the group was requested to draw a computer with different parts and explained how the parts work, as shown in Appendix 7.c.

Child 1 explained and named two speakers on the sides of the computer and a mouse. He also drew a black keyboard without buttons but did not name it.

Child 2 drew an ‘X’ on the upper-right corner of the screen and explained that the window closes when she clicks the cross. She said that the images on the screen were the theme of the computer. There was a keyboard below the computer, and she said it was for typing. A red rectangular box represented a timer, and when all the sand fell, it meant that it was another child’s turn. Although there was a mouse linked to the computer, she did not explain and name it.

Child 3 said that he drew a speaker and a light bulb on the top of the computer but did not explain why, although another child said it was used for typing in the dark. He drew two  shapes, which represented loading something.

Child 4 drew a keyboard below the computer but could not name it properly. He only pointed at the keyboard in the computer room and said they were the same. There were also some checkers on the keyboard, which represented the buttons that were used to switch off the computer. He drew a speaker on the side of the computer and named it. He also drew a printer on top of the picture and explained that it was for printing pictures. A mouse was linked from the corner of the computer, and he named it correctly.

Child 5 drew two speakers on the sides of the computer and named them correctly. She also drew a keyboard with colorful buttons but without numbers and letters. She said that the printer can print out the picture, although she did not draw a printer in the

picture.

5.4.4 Group 4

There were five pupils in this group, including four girls and one boy. Below illustrates their experiences and attitudes to the use of computers:

1. All the group members had a computer at home. Three group members said they could only play with the computer on weekends. One of them was allowed to play every day, and the last group member said she was allowed to play with the computer whenever she finished her homework. Most of them said they played the computer with their siblings, and one group member she played with her mother, whereas another one said she played by herself.

2. Most of them thought there was nothing to learn from the computer, and playing with it was just for fun. Only one group member thought the computer could teach her English, another group member said she could place photographs on the computer, and one group member said she can watch something on it.

3. In terms of their favorite games, two group members liked cooking games, and one group member liked puzzle games. In contrast, in terms of the games that they disliked, three group members did not respond, and one girl said she did not like the Superman game, because it was for boys.

4. Three of the group members said that they learned using the computer from their siblings, one group member said she learned from her parents, and another group member said she learned from her cousin.

5. Four of the group members said that they liked going to school because they can play in school. One group member said he liked it because there was a computer. The group liked it best that the school focused on physical play, painting, and using the computer. In terms of the activities in school that they disliked, one group member said she did not like art activities because she did not know the steps in paper folding. In addition, one group member said she did not like the fitness test in the physical play, and another group member agreed, saying she felt tired and in pain after the test.

The drawings for this group are found in Appendix 7.d. Child 1 explained that the green part in the picture was the screen. She said that the red rectangular box with the buttons was for adjusting the lightness and darkness. She also explained that the orange box with some buttons was for pressing, and some English words appeared on the screen when pressed.

Child 2 explained that his computer was black in color. He said that there were green lights that twinkle at the bottom of his home computer, and he did not know why it twinkles. He drew two mice, one linked to the computer and one linked to the hard disks; then, he named the mouse and said it was for clicking. He also explained the two rectangular boxes were for switching on the computer, but he did not know their names. He shared that he forgot to draw the speakers, but they should be placed on two sides of the computer.

Child 3 drew a tiny circle on the bottom-left corner of the computer and explained that it was the main power button. She also wrote 'MENU,' and 'AUTO' and drew two triangles along the power button, which were the electronic buttons. She named the mouse, which was linked to a separate box next to the computer. She also named the keyboard, although there were no buttons on it.

Child 4 drew a pink rectangular box, which represented the display. She named the mouse, which was linked from the keyboard, and explained that it was for clicking. She drew a keyboard without numbers and letters. She said the squares on the keyboard represented the buttons.

Child 5 drew a brown rectangular box but did not name it, and she said she forgot to

draw something on it. She explained that the words Admin, Alice Yeung, and Daisy on the screen were copied from the computer.

5.4.5 Group 5

There were five pupils in this group, including three girls and two boys. Their responses to the questions are summarized below:

1. All the group members reported that they had a computer at home. Two of them could play with the computer after finishing their homework. One group member could play after finishing his homework but with the parents' permissions. Another group member had to get his/her father's permission, and the last group member could play with the computer any time. Two group members played with the computer at home alone, whereas; two other group members played with their brothers at home.

2. Two group members said they learned using the computer from their fathers. One group member learned from a family member, another group member learned from his/her sister, and one group member learned by himself. In addition, one group member said he learned writing words with the Chinese software 'Pen Power' writer in the computer, and his father helped him when he had problems. Another group member learned drawing pictures in the computer. The other group member learned drawing and

writing on the computer and used it when doing her homework and writing letters. One group member also reported that she learned writing with her father and could write the Chinese words in it. The other group member said that she could type on the computer and write Chinese words with it too.

3. Car racing, 'Fish Ball,' and 'Make Up' games were named as the most favorite games of one group member. She liked the 'Make Up' game because her mother always buys her beautiful clothes, and she liked the 'Fish Ball' game, which was burning the fish ball. She enjoyed throwing the burned fish ball into the rubbish bin. However, she did not like the ghost and war games, because it was only her brother who knew how to play and connect to the Internet. Another group member liked the online game 'Damage King,' because it can damage houses and cars, whereas she disliked the robot game because it was for boys. Another group member said the card game was his favorite game, although he disliked defusing the bomb because it was difficult to play. Another group member liked playing the mahjong game, because the loser had to pay more money to the winner. Another girl expressed that she disliked the ghost game because it scared her. The last group member forgot the name of her favorite game, but she said she did not like playing the robot game.

4. Two group members liked going to school, because they could read story books and ask teachers about the words that they did not know. One group member liked riding a bicycle in school, but she was scared that she would fall from it. Another group member liked going to school, because she can learn new knowledge, listen to stories from

teachers, and borrow picture books that she could read at home. She liked the computer, toys, and family corners in school, although she disliked toys for boys. Another group member indicated that she liked going to school so that she can tell a story to her mother after reading the story in school and she liked ballet dancing. Interestingly, one group member liked going to school because there was dictation. Another group member disliked the robot game and the slide in school because he was afraid of falling from the slide.

At the beginning of the interview, the group was requested to draw a computer with different parts and explain how the parts work, as shown in Appendix 7.e.

Child 1 drew a green box that represented the computer, and a space ship was drawn next to it. He explained that the brown rectangular box was a car, and it was below the computer. He said it was a minibus with a television, and two circles represented the passengers on the minibus. He also drew five circles, which represented the wheels of a car.

Child 2 drew five squares in different colors at the bottom left of the screen and said they were for choosing the background colors. She also drew and named a mouse, which was on the left side of the picture. She drew a headphone that was linked from the keyboard, and a cable that was heart-shaped which was used to switch on the hardware. There were symbols such as ‘x,’ ‘□,’ and ‘-‘on the upper right corner of the

screen. She explained that the ‘x’ was for closing the window, ‘□’ was for enlarging it, and ‘-‘ was for minimizing it. She said the flowers were for decoration only. She also said her computer had some numbers and letters on the button of the keyboard.

Child 3 explained that she drew a ‘Hello Kitty’ computer and named the monitor that was for drawing pictures on it. She also drew a blue rectangular box to represent a hard disk and said that the pink drive was for the small disk. She then explained that the green circle under the pink drive was the reset button. She drew a headphone that was linked with the computer and said that it was for listening when placed on the ears. There were some icons on the screen, and she explained that one icon was for ‘EVI,’ an educational platform on which she listened to stories. Then, the other icon was the Recycle Bin. She said that when the Recycle Bin icon is clicked, a trash folder appears. The four stars on the screen were the stickers. She also drew an ‘X’ and an ‘l’ on the upper-right corner of the screen, and she explained that the ‘X’ was for ‘stop’ and ‘1’ was for ‘restart’. On top of the picture, she said she drew a copier to copy things from the computer. She finally explained that the objects above the computer were the four key rings from her friends.

Child 4 drew an image in a rectangular box and said it was in the computer but did not name it as the screen. He then drew some stars that surrounded the computer and explained that they were for decoration only. He also drew two speakers on the sides of the computer and said they were for listening but did not know their name. A mouse was drawn which was linked to the side of a keyboard, and he said that it was for moving the cursor. He explained that the purple box represented a keyboard for typing but he did

not know its name.

Child 5 drew flowers that surrounded the computer. The purple part on the right-hand side was a flower pot. She drew five circles and explained that they were buttons for pushing, from which cartoons appeared. She also drew a speaker and said it was placed on the ears for listening.

5.4.6 Summary

In all groups, the drawings and the pupils' explanations revealed that kindergarten pupils are all familiar with how a computer looks and could represent this graphically. Most of them described the parts of the computer in general terms, such as the keyboard, mouse, speaker, hard disk, and screen, but only some could name the parts properly. They also described how the different parts of the computer worked according to their experiences; for example, they drew images on the screen, typed on the keyboard, listened to sounds with the speakers and headphones, clicked the mouse to manipulate the computer, and switched on the computer with the hard disk. Only a few of the pupils can describe the function of the printer, and they could not name it properly.

Few of the pupils realized that there were numbers and letters on the keyboard. They described that the numbers were for calculation, but none of them explained the purpose of the letters on keyboard. In addition, a few of them explained that the icons on the

screen, such as ‘x,’ ‘□,’ and ‘-‘ were for closing, enlarging, and minimizing a window of the computer. This case revealed that the pupils were familiar and confident with the computer based on both their daily lives and learning experiences and were able to use them for various purposes.

Most of the pupils in these groups had computers at home. However, parents placed restrictions on the pupils’ use of the computer; these restrictions were based on the parents’ concern about their children’s health and their desire for their children to finish their homework before using the computer. Children were specific and could achieve what they liked and disliked. Like their parents, they believe regular computer work is difficult, unlike the computer tasks in school, which are related to accumulating words and doing sums. The pupils used the computer after they have finished their ‘regular’ classroom work, the pupils viewed this approach as a reward. The pupils added that they can download photographs and paintings on computers—activities that were seen as different from and not linked to their schoolwork.

5.5 Observation

The kindergarten pupils were observed for approximately two hours over a period of five days to gain greater insights into their learning. The activities were videotaped to

increase the reliability and accuracy of the data analysis in this paper. The focus of the observations was the learning scenarios that the kindergarten teachers planned, including traditional early childhood activities such as physical play, music, art, discussions, and home corner, as well as computer-based activities. In this chapter, each learning scenario will be described, and then, a summary analysis will discuss the ways in which the activities contribute to the cognitive and social learning of the kindergarten pupils. Of particular interest is the way in which the different activities afforded opportunities for the pupils to collaborate. In addition, the role of the teacher in the learning scenario was of relevance.

5.5.1 Day 1

Scenario 1: Physical game

In this session, the pupils were divided into two groups. In Group 1, there were three boys and three girls who played a three-legged race in pairs. In the beginning, some boys did not understand the rules of the game. However, after the teacher explained and organized the grouping of the pupils, the boys showed better understanding. The girls obeyed the rules of the game well, and they also cooperated with the peers and kept pace with each other. In contrast, the boys appeared to be more self-centered and just

kept going ahead by themselves to win the game. The teacher imposed the rules of the game, managed the discipline, and resolved any conflict among the pupils.

In Group 2, there were two boys and three girls playing the three-legged race. The girls found their partners in the game with greater ease compared to the boys, but one girl was left out without a partner. In the beginning, the girls did not understand the rules of the game, but after the teacher's demonstration, they immediately understood. The boys in this group understood quickly and found the shortcuts to win when the teacher did not notice. Both boys and girls showed cooperation in the game. The teacher assisted the pupils whenever necessary, and the pupils continued the game without her presence.

Scenario 2: The EVI game

In Group 1, there were three boys and two girls in the computer corner. They played the games on the EVI website. The game was about a barbeque picnic in autumn, and the pupils had to select appropriate food on the barbeque pits. The boys in this group were much more reluctant to take turns and insisted that they should be the one to control how the game was played. Some pupils were observed standing behind the players. These boys showed that they concentrated and enjoyed the computer games more and were always eager to play. When a boy was paired with a girl, it was always observed that the boy did not collaborate with the girl and he was not willing to offer help to others. When the boys played, they quarreled about what the effective strategies to win the game were, whereas the girls always helped each other and cooperated to win the

game. The teacher managed the discipline and disputes in the classroom, except in the computer corner.

In Group 2, there were four boys and two girls in the computer corner. The children played the same barbeque game, which was related to their theme learning. The girls negotiated to have a turn and showed patience in this game. However, the boys were not very patient, and they often squashed to sit down and play. They dominated the use of the mouse. Some of the pupils discussed the solutions of the game with their peers before clicking on the mouse. In this scenario, the teacher was not around, and the pupils played in the computer corner by themselves.

In Group 3, there were three boys and four girls in the computer corner. They were doing a puzzle about autumn leaves, coloring the objects on the screen. They seldom communicated with their peers and refused their help while playing. They indicated that they wanted to manipulate the computer by themselves. The pupils seemed to understand how the game is played, but there was a challenge set for them, which instructed them to complete a puzzle. Most of them would not accept suggestions from their peers. The teacher was, again, not around during the computer activity, and the pupils just played in the corner by themselves.

Scenario 3: Computer corner

There were four girls and four boys in the computer corner playing the mathematic game about the addition of 10. The number sentences were randomly produced on the screen, and the pupils had to fill in the answers for problems such as 6 + 4 and 2 + 8. The girls discussed how to play while queuing for a turn, but the boys just concentrated on watching the screen. It was observed that the pupils understood the rule of queuing, but when they were very focused on the screen, they frequently forgot to queue up. The girls discussed how they will win the game, but the boys rarely did. They were eager to show their ability to win individually. The boys were once again more dominant in asserting their control over the mouse compared to the girls. Once again, the teacher managed the class discipline but did not enter the computer corner and stayed with the other groups in the main teaching area.

Scenario 4: Home corner

In Group 1, there were four girls in the dolly corner who were playing the cooking game. Although they discussed the roles in the game in the beginning, it was observed that

they played individually. There was a dining table and a toy kitchen in the dolly corner. Two girls pretended to be the cooks who were making sausages and vegetables at their own cooking stoves. The other two girls pretended to be the family members dined at the table with the cookery, but they did not interact with each other. The teacher was, again, not in the home corner.

In Group 2, there were six girls and two boys in the dolly corner. They negotiated on what they will play and finally decided play cooking. It was observed that some of them were willing to share the cooking utensils in the toy kitchen and the cookery on the dining table. Some of them pretended to be the cooks and served the customers at the dining table with their cooked dishes. They also allowed their peers to have a turn. The teacher provided little assistance, that is, only when the pupils were having problems in sharing the toys.

5.5.2 Day 2

Scenario 1: Class story telling using the computer

In this scenario, the teacher used MS PowerPoint to relate the story of the Seven

Brothers to the whole class. There were 27 pupils in the activity. The pupils concentrated while listening to the story. They were also eager to ask questions about the story and gave their opinions while the teacher was telling the story. They could not wait to retell what the story was about, because most of them had read the same story at home. They were also eager to manipulate the laser pointer that the teacher used while telling the story. The pupils' responses revealed that they understood that the size of the objects on the screen could be enlarged. The children were also able to understand the characters by referring to the pictures. They followed the teacher's nursery rhymes in the story and read the story happily along with the teacher and their classmates. The teacher took the leader's role in story telling and managed the class discipline during the activity.

Scenario 2: Physical play

This physical play was implemented in a gross motor room. There were 27 pupils playing the relay game, in which they transported paper blocks from one end of the classroom to another. The pupils worked in pairs, and they were divided into two groups. One boy complained about another boy who did not queue up when he was supposed to. It was observed that the pupils understood the significance of collaboration. The teacher demonstrated how the paper blocks can be transported with their peers from one end to another. All pupils followed the rules, except for a boy who did not pick up the

collapsed blocks and just ran to the other end. The paper block of a girl fell and she picked it up and kept running to the other end. The teacher demonstrated the procedure and held the discipline of the class.

5.5.3 Day 3

Scenario 1: Sharing the visit to the Chinese History Museum (computer-based)

There were 27 children in the class. The teacher used a projector and a screen in front of the children for this group activity on a presentation of sharing the digitally produced photographs from their recent visit to the Chinese History Museum. Before class, the teacher prepared the photographs that the pupils took in the museum using MS PowerPoint, inserting individual photographs of each pupil and typing his/her name on the corner of the slide. The teacher showed each slide and made a special animation effect to hide each pupil's name, because each child had to guess the owner of the photograph, and the name will not be shown until they have guessed the right owner. The owner stood next to the screen and discussed the photographs one by one to the group. The teacher asked questions about the photograph and the pupil's reason for taking the photograph of that particular object. Other pupils served as the reporters who asked questions with regard to the photographs.

The pupils were confident when they explained their photographs and showed positive feelings about the experience. The pupils clapped after each presentation. They demonstrated cooperative behavior toward each other and also answered the teacher's questions to describe their work. The teacher guided the pupils in thinking about what they had seen and learned from the visit. She served as a good model and encouraged each pupil by clapping her hands with the group. She guided the pupils in appreciating the piece of object in the photographs and she facilitated in helping them to solve problems. For example, when a pupil complained she could not see the screen clearly, she encouraged him to look again, if he/she still could not see the screen she would be invited to sit next to the teacher where the spot was closer to the screen.

Scenario 2: Small group work

The pupils were provided with different tasks, including drawing the seven brothers with pastel, making a statistical chart to vote for the brother that they liked the most, and writing a sentence in Chinese about the brother. All of them were obedient, except for one boy who kept talking to the boy next to him and moved himself on the chair. The teacher reminded him to stop, but he did not listen. Some group leaders helped their classmates in collecting the worksheets and distributed them. The teacher used a rhyme to instruct the pupils to pack up their stationeries on the tables, and the pupils followed.

She also played the ‘statue’ game with them, and the class appeared to be happy when playing. She helped solve conflict that arouse between the pupils. For example, the pupils were requested to draw a house by copying it from a story book, and two groups were not willing to share the story book; thus, she placed it on a book stand for everyone to see.

Scenario 3: Free-choice activities

The pupils were allowed to choose other activities from different corners after they have finished their class work. It was observed that there were four children in the computer corner who played the theme activities on the EVI educational platform. The activities were related to the theme learning about winter, for example, selecting the right animal during the winter season. The boys were more eager to play with the computer, and they did not queue up. They just stood next to the computer and interfered by pointing to the computer screen. There was only one girl who waited for her turn and played with the computer. Other pupils played different tasks on the table and floor, for example, playing fishing and board games. However, they had no collaboration. The teacher guided them in finishing their home work, and to keep quiet, she encouraged them by giving stickers.

5.5.4 Day 4

Scenario 1: Computer activity in the computer room

The teacher led five pupils to the computer room. The teacher browsed the Internet with the pupils using the Internet Explorer and searched for information about the costume of the 'King' in the old Chinese era. The pupils observed the difference between the features of the costume in the old days and in the present. They said there were dragons in the costume of the King and there were different types of clothing for different occasions. For example, they realized that they wear uniforms in school. However, one girl did not realize that the King's costume was only for the King. It was observed that there was interaction between the teacher and the pupils through a discussion on the materials used for the King's costume and the life of the King from the Internet. The teacher was the facilitator whose role was to stimulate the pupils to think and respond.

Scenario 2: Doing a worksheet about different types of animals (sea, air, and land)

The teacher posted a picture of different animals on the whiteboard and discussed the answers with the pupils. Some pupils gave the answers aloud while the teacher was

preparing the pictures. The pupils were required to group the animals according to habitat, that is, sea, air, and land, on the worksheet. It was observed that they individually worked on the task, except for the case of one boy who raised his hand because he did not understand how he can complete the worksheet. While the teacher was helping this boy, another boy complained about other pupils who shouted in the group, saying that they were just wasting time. Meanwhile, another boy just kept on raising his hand for a long time, but the teacher did not call his name to acknowledge him. Another girl shouted out an answer to one of the questions when she found it in the picture. The teacher tried to control the pupils and prevented them from shouting, but they did not stop for 15 minutes until the activity was finished.

Scenario 3: Group time

The teacher turned on the computer and projector in the classroom. She browsed the EVI platform and read the story about Christmas with the pupils. They listened to the story quietly. After the story, the teacher asked the pupils how she can give a Christmas card to her cousin overseas. One girl said that she should wait until her cousin comes back. Another girl suggested putting a stamp on the envelope and then sending the Christmas card. One boy answered flying by a plane and giving it to the cousin, whereas another boy suggested sending a letter to the cousin to ask him to come back. Then, the teacher asked how she can send the Christmas card in a quicker way. Finally, one boy

said that she could send the card through email. The teacher then told the class that she sent them an electronic card through the 'Yahoo' email. She opened the mail, and the card appeared on the screen. It was observed that the children were excited about receiving an electronic card and they read the content of the card together.

5.5.5 Day 5

Scenario 1: Music activity

The teacher led the whole class to the music room for this activity, which required the pupils to sing a song and integrate movements to the song while the teacher played the piano. One boy disturbed the boy next to him by singing the song into his ear. Another boy pushed a boy because he disliked him sitting next to him. Then, a boy suggested that people wear thick clothes during a cold weather as the other pupils sang a song about turning on the heater and did the actions about the song. The pupils followed the pace of the music with fast and slow motions as the teacher played the piano at varying paces. The teacher instructed a group of pupils to play the maracas, but a boy in this group just wanted to play with the bell. The teacher then stopped him and promised to let him play with the bell tomorrow; then, the boy chose the maracas with the group. It was observed that the pupils understood the rules in picking the musical instrument and

placing them on the floor before the music started. In the beginning, the pupils did not know how to play with the maracas; thus, the teacher demonstrated how it was played. The teacher then played the piano, and the pupils sang the song accompanied by the maracas. The teacher played an active role by giving instructions and demonstrations to the pupils throughout the activity.

Scenario 2: Story time

The teacher told the story ‘Who Stole the Home of Little Squirrel’ to the class. When the teacher read the story, most of the pupils listened quietly, except for four boys who did not pay attention to the teacher and a girl who played with her fingers. When the teacher asked why animals need more food before winter, a boy said that it was because the animals wanted to be alive in the winter so they eat full and go to bed. Then, the teacher asked whether the bird was right when he stole the squirrel’s food, and all the pupils said the bird was naughty. The pupils also knew that people and birds do not need to hibernate unlike other animals, for example, snakes and frogs. The pupils also learned that migratory birds fly to the south during winter. The teacher allowed the pupils to discuss freely about the story and asked them questions to stimulate their thinking.

Scenario 3: Computer activity (Paint brush)

The teacher led eight pupils to the computer room, opening the Paint Brush software before the pupils entered. Then, she demonstrated the functions of Paint Brush. Then, the pupils worked in pairs by themselves. One girl knew how to choose the color from the panel by clicking on her favorite color. All of the eight pupils knew how a color can be erased using the rubber from the Tool panel on the left of the screen. They also chose the color from the color barrel and picked the spray gun from the tool bar. It was observed that they were confident in using different functions of Paint Brush after the teacher's demonstration. The teacher asked what the pupils should do when they picked a wrong color, and one boy suggested using the eraser, whereas a girl suggested using the edit and back functions. Then, the pupils created their cards using Paint Brush in pairs. The teacher's demonstration of the software in this activity reinforced the pupils' understanding, because they learned to ask about the techniques used in the activity.

5.5.6 Summary of Observations

In terms of cognitive development and learning, it was observed that the only activity that was very challenging for the pupils was the electronic story of the 'Seven Brothers.' However, the visit to the Chinese Museum, in which the pupils documented their

experiences using a digital camera and presented their photographs using a computer with the peers in the class, was considered to be quite challenging. The pupils also explored widely through the Internet with the teacher about the lives of people, including the King in the old Chinese times. This activity showed that computer activities stimulate the pupils' cognitive and learning aspects. It was observed that the teacher was not in the computer corner in the classroom; thus, he/she was not able to ask the pupils about their experience on the computer activities. Nevertheless, for the computer activities in computer room, the teacher worked with the pupils in the learning process, for example, searching for the King's costume from the Internet.

Based on the observations, it was found that the pupils understood the content of the activities that were not challenging, which was evident in the pupils' work and their answers to the teacher's questions. Sometimes, the pupils cannot even wait to answer the questions and called out the answers, which disrupted the class discipline. With regard to knowledge about computers, it was observed, in several computer activities, that the children were able to work on the EVI platform at the computer corner without teacher's supervision or assistance. They manipulated the mouse without assistance and played the activities on the platform according to the teacher's instructions. The pupils were also familiar with the 'Paint Brush' software. They made some art work with it to present their learning and experiences about the themes.

In terms of social development and collaboration, it was observed, during the computer activities, that most of the boys showed higher interest and confidence when playing the

computer. They were eager to win the computer games, and thus, at times, they did not follow the rules and appeared less collaborative with their peers. However, the girls discussed the strategies with their peers before playing with the computer, which demonstrated that the girls were more collaborative when they worked with their peers in computer activities. In addition, it was observed that some boys were not willing to collaborate with the girls when they played on the computer. However, in the computer activities, both boys and girls were observed to be collaborative and to work in pairs, for example, when they were making cards.

In non-computer activities, the boys showed less concentration when participating in the activities and did not follow the rules, and sometimes, they even disrupted other peers. In contrast, the girls were found to be more obedient when participating in both computer and non-computer activities. When the pupils worked in groups, they sometimes collaborated with each other; however, a few of the boys had different ideas when they were involved in group discussions. Most of the tasks were individual, and the pupils were provided with less group work that enhances their social and collaborative skills.

The teacher mainly assumed an active role by instructing and supervising the pupils in finishing the noncomputer class tasks. However, she was not at the computer corner, allowed the pupils to explore the EVI platform, and reinforced the pupils' learning on the theme-related activities on the platform. In the teaching practice and strategies, the teacher served as a good model in using the computer and projector through teaching

and learning aids by stimulating their learning interest and documenting the pupils' learning process and outcomes. For example, during the visit to the museum, the pupils were allowed to use a digital camera to document what they have seen and what caught their interest and they were encouraged to present their experience in class by using MS PowerPoint. Furthermore, the class browsed the Internet in the computer room to learn about the costume and daily lives of people in the Chinese old times. These activities formed the follow-up activities for the museum visit and were used in extending the pupils' learning. In addition, she enriched the pupils' learning and daily life experience about using the computer; for example, she introduced the advantage of using the email and e-card when integrating technology into the theme of 'Christmas.'

Chapter 6

Countryside Kindergarten

Introduction

The summary of statistics report from the Census and Statistic Department in Hong Kong (2006) revealed the median monthly domestic household income of Hong Kong Island residents was higher compared with other areas under the Special Administrative Region. Kowloon was the lowest among the three regions. Three kindergartens were selected, one from each Hong Kong region; all were non-profit institutions. Countryside Kindergarten is a nonprofit organization located in a public housing zone in a suburban area in the New Territories. Most parents of the children who attend the half- or whole-day kindergarten program have low socio-economic status. The upper kindergarten class has 28 children taught by two head teachers responsible for the class.

The thematic story approach is the basis of the school curriculum. Daily activities include half an hour of group time and one hour of small group time for free play. One head teacher usually leads a group activity during small group time, during which the computer corner serves as a free-play activity area. The principal purchased the software installed in the computer to integrate it with their thematic learning when possible.

As in Chapter 4, we will present a narrative from the data to illustrate the ways in which the principal, the head teachers, the pupils, and their parents enact the educational experience in their school and family contexts. We are interested in how computers and other new technologies, as well as the perspectives of the main stakeholders with regard to the use of ICT for teaching and learning in Hong Kong kindergartens, are integrated into the mainstream activities in the kindergarten upper class.

As stated in the previous chapter, the data for this narrative were derived from the following sources:

- Interview with the principal
- Interview with the two head teachers in the upper class (K.3)
- Focus group interviews with 28 kindergarten children
- Focus group interviews with 11 parents
- Observation of teachers and children
- Documentation such as teaching lesson plan and evaluation, teacher's teaching materials, quality of software, and pupil's work.

6.1 Interview of Principal

The interview took place in the principal's office in the kindergarten. The full questionnaire for this interview is provided in Appendix 3.a. Topics for discussion and questions were organized around the following issues and follow up questions were

asked where clarification or examples were needed.

6.1.1 Rationale for Using computers in the Early Childhood Program and the Importance of Professional Development

The principal said she felt it was suitable for pre-school children to use computers, but did not think that it was necessary to conduct formal computer lessons for children of pre-school age. The school started to implement computer activities about three-and-a-half years ago, and the principal had collected a few educational game CD-ROMs that enabled the children to play and learn by themselves. The principal believed that computers were another mode of learning for pre-school children, and that the school should offer a variety of learning opportunities for the young children in their care.

The principal mentioned that the age of the children was a concern when thinking about incorporating the use of computers into their early childhood program. She believed that K.1 (three- to four-year-old) children should not use computers in school because their fine motor skills were not developed enough to control the mouse. She said teachers did not let the children use the computers until they felt that their fine motor skills were adequate. This did not usually occur until they were four- or five-years-old, which was a good time to introduce them to computer activities in the kindergarten context.

Regarding the computer skills of the teachers, the principal said that some teachers

obviously had better computer knowledge and skills than others had. She was confident that all the teachers could use MS Word and PowerPoint for teaching purposes.

Although the principal thought that computer skill training was necessary for the teachers, she did not view it as a priority. Thus, there was no professional development associated with developing computer skills for teachers. The principal required every teacher to use computers to make teaching lesson plans and children's portfolios. The principal believed it was important for teachers to know how to operate the computer for such purposes and that it was more convenient and efficient for presenting their plans. She regarded the computer and associated skills as important for her teachers in terms of teaching and administrative roles.

6.1.2 Teaching and Learning with Computers in the Kindergarten Classroom

The principal installed two computers in a computer corner for each classroom, and built a computer room shared by all the classes in kindergarten (see Appendix 5.b for a floor plan of the classroom).

The principal encouraged the children to play in pairs so they could cooperate with each other, as well as learn from each other's strategies and actions. The principal said that often, computer time was in the classroom context. However, occasionally, the teachers would bring a group of children to the computer room during free-play time to access information from the Internet. There are eight computers in the computer room. One of them is used mainly by teachers to update school website information and for

administration purposes. When in the computer room, the children usually have to queue up to have a turn at the computer. The principal did not view this as a problem since they could use them everyday in the computer corner in their room, and because most of them have computers at home.

She said that during small group activities, the teachers remind the children about the number of unfinished tasks they have. If they have completed all the tasks, then they are allowed to use the computer. The principal said she encourages the teachers to allow the children to queue up to play with the computer to make sure that each child had a turn. The head teachers usually encourage the children to decide for themselves if the wait is worth it or whether they should choose another less crowded activity.

She noted that the teachers said that the K.2 children were good at using computers since they had opportunities to use them in their previous year at the kindergarten. They knew how to turn them on, and they can play some games by themselves.

The principal is responsible for purchasing software for the school, and her main considerations are the age of the children and the quality of the software. She usually bought software that she thought would be appropriate for pre-school children, and tried them after purchase to advice teachers about the special features. Sometimes, the teachers were also involved during the purchase, but they were not allowed to buy software without first getting approval from the principal. Overall, the principal thought that the quality of the software available was sufficient. She rated Taiwanese software as superior to some local software.

The principal said that computer activities were choices, not priority learning goals for the school. Thus, there are no curriculum guidelines for kindergarten teachers when designing and implementing computer activities. Additionally, there was no assessment on the children's use of computers. The principal mentioned that the teachers would consider what computer software was available when they were planning for a theme. Although she knew this was often difficult for teachers, she encouraged them to incorporate computer activities into such planning. For example, she suggested that the teachers could make an e-storybook using PowerPoint rather than the traditional book format to enhance the interest of children. The principal believed that this kind of multimedia learning resource would engage children more during the learning process. The principal also asked the teachers to reflect on the learning processes that the children had experienced in terms of their use of the materials. She asked them to think about whether the electronic medium enhanced the learning, and to be critical about the ways in which this was achieved.

A group of teachers was responsible for making the school's website, which provides information and news about the school for parents. Games are also available on the website for use by parents and their children. The parents are not required to pay extra charges for access to the website, and both children and parents can log in to play available games. The principal mentioned that she usually posts school notices about good websites on the webpage. Moreover, the principal added one more section, "Mailbox to Teach Kids," where parents could communicate with the teachers or the principal about the difficulties they face in teaching children. The teachers and the principal shared their professional advice via this mailbox. There was also a message

board usually updated once a month. Children's artwork and photos of school activities have been posted and updated on the website each month.

Although the principal agreed that it was a good idea to use the educational platform during pre-school, she felt that she did not have the time nor skills to maintain the site herself. Teachers with advanced computer skills were responsible for the school website. However, the principal was also careful that the teachers were not overloaded with this additional responsibility.

The principal said that she uses the computer frequently, mostly for typing school notices and for keeping current news with the EMB, the official government website. She uses the computer throughout the day for minutes of meetings, and uses the personal schedule on Yahoo. She added that she frequently uses PowerPoint presentations for parents. Besides using computer in the office, she also uses the computer at home to play games, check e-mails, and read the electronic version of the newspaper. The principal said that she learned to type during her church work, which also involved editing documents. She has obtained her other computer skills from the Hong Kong Institute of Education, where she took her teacher education training. The principal emphasized that the parents selected the school based on their overall program, not just for their use of computers.

6.1.3 Summary

The interview with the principal revealed that she was in favor of using ICT in her school on a limited basis. She agreed it was important for teachers to know how to operate computers because it helped them become more efficient in their work. The principal thought the quality of the software available in Hong Kong was generally acceptable. There were no curriculum guidelines for computer activities in schools, and she purchased software when she thought they were appropriate for the children's development. The teachers were encouraged to use computers to extend their teaching strategies and select available software that could be integrated into the theme learning. The teachers also maintain the school website to share school information and communicate with parents. The principal was also committed to using the educational platform, as she felt it enhanced what they were doing in the school.

6.2 Interviews of Head Teachers

There were two head teachers in the K.3 class of the Countryside Kindergarten. In the narrative, the head teachers will be called Miss Pat and Miss Chin. They were interviewed individually in the classroom after school hours. The interviews took about 30 minutes each, and were voice recorded.

6.2.1 Head Teacher 1 – Miss Pat

6.2.1.1 The Relevance of ICT in ECE.

Miss Pat had been teaching kindergarten children for three years and she joined the Countryside Kindergarten in her second year of teaching. She obtained basic kindergarten training in 2001. Previously, she was an assistant teacher for a year, and this is her first year as a head teacher. She agreed it was appropriate for pre-school-aged children to play with computer games that enhanced their learning and hand–eye coordination, for example, when they manipulate the mouse. She said that each child should not play with the computer for more than 10 minutes each day.

6.2.1.2 Teaching and learning with ICT. Miss Pat began to teach computers in class since the second term of K.1 and usually taught the computer games available at the computer corner. She also said that the children usually used the computer in the classroom instead of in the computer room, which was shared by all classes. They used the computer once a week. However, last year, the school ran a project called "Knowing Myself," with the K.3 children, which required the children to make face masks in groups using the computer. Since the computers in the classroom had no Internet access, some group activities were conducted in the computer room where the teachers operated the computer and some children accessed information from the Internet.

In this school, there were two computers installed in every classroom from K.1 to K.3 classes. The principal suggested this setup, and the teachers did not know the rationale for installing two computers in one computer corner. However, there were several factors considered when setting up the computers at the computer corner in the

classroom. The factors considered included how the computer activity was being implemented, how many children played the computer at a time, and the physical space needed to queue up. When two children shared one computer, one child would play the game with the mouse while the other would observe. Miss Pat mentioned that the children, especially the K.3 students, liked to play with computers. The computer corner was usually crowded, as the children often forgot to queue up and watch from behind the children who were playing.

Miss Pat noted that the children learned differently when they were engaged in computer-based activities, compared to when they were doing non-computer activities. She usually produces electronic stories using PowerPoint. Since there was no projector in the classroom, both head teachers improvised and used the two computers in the computer corner of the classroom simultaneously when they were having group time. For example, the children read the electronic stories made using PowerPoint, and clicked on the window media player files to listen to the animal and car sounds produced by the computer. The teacher said that the children appeared to concentrate better and showed greater interest in the activities when they used the computers, although the children sometimes complained that they could not see the words clearly because the monitor was too small.

The teacher realized that the animations and sounds of the PowerPoint material accompanying the story attracted the children's attention. Moreover, Miss Pat noted that the children paid better attention when she used the computer, and appeared to be happier whenever the computer was utilized. She said not every teacher produced

multimedia teaching materials using PowerPoint at the beginning of the term. She agreed that the kindergarten teachers should use computer-aided teaching so that children could learn through different teaching strategies. Given that most children have a computer at home nowadays, Miss Pat believed that the teacher should also use different strategies to match children's experiences in this new century.

There was no policy or curriculum guideline governing the use of computer activities by teachers in the school. Teachers can decide whether they would use computers as teaching aids when designing class activities. However, Miss Pat said that according to school policy, the teachers must get their lesson plans approved by the principal. For the multimedia teaching material such as PowerPoint, the teachers are required to submit the PowerPoint presentation to the principal for amendment or approval. The principal then keeps a copy of the multimedia teaching materials for record purposes. The principal is responsible for purchasing the software used by the teachers. However, they can also try the software out first to see if it is appropriate. Children were not allowed to borrow the software to be brought home, but they can borrow audio tapes and videos.

Four teachers were responsible for the design of the activities while the other two were responsible for preparing the software and setting up activities in the computer corner. The head teachers were responsible for choosing the software that corresponded with the theme of the activity. If no software matched the theme, they would choose age- and learning-appropriate software instead. Furthermore, the teachers were also required to search and source different media that could be used for producing multimedia teaching

material; for example, a teacher may download the sounds of a train and present them as a teaching or learning material for the children.

Miss Pat noted that there was no evaluation form on the software. Nevertheless the teachers evaluated the multimedia teaching material and presented the teaching evaluation to the principal. The theme teaching was evaluated and the principal would comment on the evaluation and make recommendations for the following year. However, Miss Pat said there was no evaluation checklist for computer activities, as they were regarded as the interest activities.

Miss Pat said that there were some computer training courses provided for the teachers. Last year during the summer vacation, a parent of a graduate taught 'Flash' to Miss Pat and other teachers. However, Miss Pat found this software too professional and complicated, and felt more comfortable using PowerPoint, which she believes produced similar effects. Miss Pat learned PowerPoint and Word by herself at home before she became a teacher. She primarily uses Word, PowerPoint, and Excel on her home computer to produce teaching materials. She also searches information on the Internet and sends personal e-mails. At school, the teachers are provided with staff e-mail accounts, which are used for school notices. Moreover, the parents could also communicate with the teachers through the bulletin board on the school's website. Miss Pat said that last year, she co-coordinated the school e-mail system, and it was her duty to verbally check that all colleagues received the principal's e-mails.

6.2.2 Head Teacher 2 – Miss Chin

6.2.2.1 The Relevance of ICT in ECE.

Miss Chin has been the head teacher of the Countryside Kindergarten since it opened in 2001. She agrees that computers have become a part of people's daily lives and noted that their popularity was clear, as most people have a computer at home nowadays. She also claimed that the computers are important for adults, and are a significant part of children's lives. For example, school curriculum guidelines for computer activities are directed toward primary school children as young as Grade 1. Miss Chin believes it is appropriate for pre-school children to use computers, but only when they are intended for fun rather than for learning. She said the school has started running computer activities in the classroom since it opened. The previous school that Miss Chin taught in also ran computer activities. She believes most children know how to operate a computer without the help of a teacher. She generally allows children to play on the computers by themselves, and provides support when the children find the games too difficult.

6.2.2.2 Teaching and Learning with Computers in the Kindergarten Classroom.

Miss Chin believes that when the computer software is relevant to the theme of the class and the age of children, it can attract their interests and consolidate their learning. However, unless the software was recommended by the principal, Miss Chin would seldom read the content of the computer games; rather, she would only read the instructions on the cover.

The children usually played on the computer in the classroom, and would only go to the computer center if they needed to search the Internet for information, or play online games and educational software. Generally, the teachers seldom asked children to work on projects that required them to search for information on the Internet using the school computers; rather, the children usually searched the Internet at home with their parents. There are a few rules that govern the children's use of the classroom computer. For example, the number of children allowed in the corner at one time is limited, and the children are required to queue up before they can play. Each child has to wait his/her turn before he/she can play on the computer. Although the children agree that they would stop playing when the game was over, children who ordinarily had shorter attention span and less patience continued playing beyond their turn; these children did not display this behavior when they were involved in other activities. Miss Chin explained that these children remained engaged when playing computer games because of the animation, and because they were in charge of their own learning process. There is always a long queue at the computer corner. She asked the children why they preferred to queue at the computer corner, and the children replied that they wanted to play games. Miss Chin said that she would monitor those children who have played too long and directed those children to other corners.

Miss Chin placed several software at the computer corner and let the children select which software they wished to play; she then observed which games the children were playing. The chess games needed longer time to play than many of the other games, and she was worried that if a child chose to play this game, the other children may be

disadvantaged and miss their turn. Sometimes, the children complained about the amount of time they had to wait and they often asked the teachers “Why is it still the same person playing at the computer corner?” Miss Chin observed that the children had more patience and greater concentration when they played computer games than when they were involved in other activities. She conjectured that they were attracted to computer games because of the images and colors. Miss Chin said she did not have any special plan to integrate the computer into the curriculum. Most teachers used software and set computer activities related to theme teaching. If the teacher did not specify a software or computer activity, the children could choose whatever software they preferred during small group time. Initially, Miss Chin taught the children how to play various software games, but once the children gained familiarity, they were able to play by themselves.

The school does not provide any guidelines that specify how the teachers should use, run, or evaluate computer activities, and Miss Chin did not evaluate computer activities separately from the learning objectives. When selecting software for the teaching themes, she believes it is important to take the language used into consideration. Most software chosen by Miss Chin were in Cantonese. The software in the classroom were usually purchased by the school, and the teachers would recommend certain software to the principal if they found some to be particularly good for children. Miss Chin said she believed an educational software was good if it provided content appropriate for her students. She usually reads information offered via a promotion or tries the demonstration products in the market. She then recommends software to the principal if she perceived them to be appropriate. Miss Chin commented that the software she used

in school sometimes had technical problems, either due to the way that children manipulated it or to the quality of the software itself.

Miss Chin mentioned that she uses computer-aided teaching around three to four times in 10 theme activities. She uses computer-aided teaching this frequently, as she believes that children concentrate better when they could focus on the text and sounds of the computer. However, the effectiveness of computer-aided teaching depends on the ratio of children to computers. For example, computer-aided teaching was not appropriate when there was only one computer for 20 children. Miss Chin usually used PowerPoint to produce the teaching materials. She scans pictures into the PowerPoint presentation and turns them into motion pictures. Last year, she also used multimedia teaching materials in two out of three topics per unit. She believes that multimedia teaching material could enhance children's memory and consolidate their theme learning. Miss Chin and Miss Pat took turns writing the teaching plan for the class. Together, they decided whether it was appropriate to use computer activities as teaching materials for specific themes.

Miss Chin said she used a computer at home, but mostly for work. Although the school seldom provided computer training for the teachers, she learned to use the computer during her teaching career, primarily using Word and PowerPoint. Miss Chin agreed that kindergarten teachers need to know about computers so they could effectively keep school records in order. She also noted that the computer helped her more in administration tasks and classroom matters rather than in teaching.

Miss Chin believes it is necessary for teachers to improve their computer use. She notes

that it was not compulsory for in-service teachers to attend computer courses due to time constraints.

6.2.3 Summary

Miss Chin and Miss Pat both asserted that nowadays, ICT is an important part of kindergarten teaching. With the help of the computer and the Internet, teachers can be more effective when preparing lesson plans and producing multimedia teaching materials. However, they believed it should not be compulsory for in-service teachers to learn the computer, as they were too busy with work. In school, head teachers decided together when it was appropriate for ICT to be integrated into the themes. PowerPoint was the most common software that the teachers used to produce multimedia teaching and learning materials. They believed that computers benefited children, as the visual and audio effects bolstered the children's attention span and memory.

6.3 Interviews of Parents

Eleven parents participated in the focus group interviews. They were divided into two groups of five and six members. The interviews took place in a school classroom and were held for about 30 minutes per group. The interviews were videotaped for data analysis purposes.

6.3.1 Parent 1

Parent 1 had a son and a daughter. Her daughter was the younger sibling in the family. She said computer applications were encouraged in the family, and that her daughter had her own computer, even at the age of four. She did not teach her daughter how to use the computer; her daughter just learned computer skills by observing her brother. Parent 1 often asks her daughter to help her retrieve information from the computer; for example, her daughter helps her organize digital photos on the computer. She has a positive approach toward computers and in the interview, she said, "computer makes daily life convenient." Apart from organizing family photos, she also uses the dictionary function of the computer to find out the meaning of specific words. Moreover, she agreed that children should learn how to use computers at a young age and said, "Computer software is a good teaching tool for children to learn different skills through activity-based learning." She allows her children to play computer games as long as they finish their homework first. She also realizes that computer games could encourage her children to finish their homework and dictation quicker. She does not worry that her children may be obsessed with the computer, as her daughter also likes playing at home corner. Her son also likes hiking and both usually participate in family activities during weekends. Besides, she also noted that there are benefits to be gained from using the computer starting from a young age. For instance, her son improved his language skills by learning how to type in Chinese. Her daughter, on the other hand, uses the computer for drawing and watching VCDs she borrows from school. She believes that children have an intrinsic interest in computers and notes that they could be effective teaching tools for teachers, and provides children with a means to learn different skills.

6.3.2 Parent 2

Parent 2 has two sons who attend the K.2 and K.3 classes at the Countryside Kindergarten. Both have access to a computer. The older son knows how to browse the Internet, but the younger son only knows how to play computer games. The younger son spends less time on the computer because he can only play computer games when his brother turns the computer on. The computer games they play at home are either bought from game stores or downloaded from the Internet. Since the mother is busy at work, the children are taken care of by their aunt. The mother arranges some family activities during weekends and school holidays. Therefore, the children do not have many opportunities to spend time on the computer. She also said her children switch off the computer when they are asked. The mother uses the computer mostly for work in the office and seldom uses it at home. She does not use the computer/Internet to shop online.

6.3.3 Parent 3

Parent 3 has a son and two daughters. One of her daughters attends the Countryside Kindergarten, and learned to play computer games by following her elder brother. Parent 3 said the school has limited computer-based resources, which means the children have limited time to play on the computer at school. Therefore, her children prefer to play on the computer at home. Like the other parents, Parent 3 allows her

children to play computer games as a reward after they have finished the homework and weekly dictation properly. At home, her computer is placed in the living room. Parent 3 bought educational computer games for the children, such as drawing, memory card, Chinese, English, and Mathematics. Her daughters like to play on the computer with their other siblings and their parents. Apart from computer games, her children also engage in other activities such as play cooking; thus, they are not obsessed with the computer. Moreover, Parent 3 does not use the computer on a regular basis, as she is not required to use the computer at all as part of her job.

6.3.4 Parent 4

Parent 4 has a daughter and a son, with the former as the older child. The son is the youngest member of the family, and attends the Countryside Kindergarten in class K.3. In their home, the computer is placed in the living room. The computer is mainly for her daughter, who is in Grade 2 at primary school. She said her son does not use the computer competently, but is curious and sits next to his sister whenever she uses it. Her son is not allowed to use the computer by himself; he could only use it with his sister. Therefore, when his sister is not at home, her son usually watches television or plays with other toys by himself.

Her son likes sports such as basket ball, soccer, and cycling, and does not have much time to play with the computer. Furthermore, she herself has limited computer skills, and notes that she is not interested in computers. She only uses the computer occasionally; for example, to make an appointment to renew her Hong Kong

Identification Card via the Internet. However, she needs her daughter's help to do so.

6.3.5 Parent 5

Parent 5 has a son who attends the Countryside Kindergarten and is in class K. She taught her son how to use the computer after she learned several computer skills from her husband. Her ability to use the computer is quite limited. Therefore, her son usually observes his father to learn additional computer skills. She notes that her son is very interested in the computer, and he would become excited when he sees images on the screen. He also likes to play computer with his parents. However, her son does not have many opportunities to play on the computer at home and improve his computer skills, as his grandparents take care of him after school and there is no computer at the grandparents' house. At home, her son is not allowed to access the computer alone because his father is worried he will accidentally delete files. In addition, there are no computer games at home for her son to play with, and the computer is mainly for adults at home, who likes to read the newspaper on the computer via the Internet. While the school her son attends has computer-based activities, they chose this school because of its good reputation. On weekends, rather than play at home, the family normally goes out for dim sum, or goes swimming (in the summer time).

6.3.6 Parent 6

Parent 6 has a daughter who is in P.1 and a son who are in K.3 at the Countryside Kindergarten. The family has two computers at home. One computer is in the bedroom

of the parents and the other is in the living room. The children use the computer in the bedroom while the parents use the living room computer. Both parents encourage their children to use the computer and the father teaches them to play computer games. However, the parents have rules that govern their use. The children are only allowed to play computer games after they finish their homework, thus they are motivated to finish it quickly. The children arrange a schedule that says when each one can use the computer, which means the children rarely argue with their parents about when they are allowed to use the computer. Since the children do not know how to access the Internet, they could only play computer games. Apart from computer games, her son also rides his bicycle, goes to the park, and goes shopping during holidays. The parents observed that their son was not too involved in computer games at the expense of his other activities. Parent 6 is competent in computer applications such as Word and Excel, and pays the utility bills through the Internet.

6.3.7 Parent 7

Parent 7 has a son who is in K.3 at the Countryside Kindergarten. He likes using the computer like his father. Her son can search and source information from the Internet by clicking on the icon or by typing Chinese words. She said it was advantageous for her son to use computer at a young age; for example, it could help him enrich his Chinese and English vocabulary, as the computer requires him to read information on the Internet and type Chinese words. However, she also said she is worried her son would access online information related to sex or violence. Therefore, she placed the computer in the master bedroom and regulates her son's use of the Internet, preventing

him from browsing inappropriate websites. Despite this, she encourages her son's use of the computer and prefers that he plays on the computer rather than watch television. In addition, Parent 7 plays computer games with her son and reads stories from the Internet to him. She prefers to read stories from the Internet, rather than from books, because she likes the colorful pictures and the text. Her son also enjoys playing memory and mathematic games, such as shopping games. She said that learning with computer activities not only helps enhance children's memory and language skills, but also fosters their intrinsic motivation to learn. Her son helps her download music from the Internet. Since Parent 7 and her son have limited computer skills, they learned many computer applications from her husband. Sometimes, the mother forgets certain skills and needs her son's assistance.

Parent 7 uses online banking and makes appointments through the Internet; therefore, the computer is part of her daily routine. She enjoys playing computer games with her son for entertainment. On weekends, the son is allowed to play freely on the computer provided informs his parents. Nevertheless, her son does not use the computer too much as he is more engaged in other activities such as playing the piano, riding his bicycle, and playing Chinese chess. The emphasis the school places on language and reading benefits her son as it helps consolidate his computer-based learning. For instance, he prepared a book about France by sourcing information about France from the Internet.

6.3.8 Parent 8

Parent 8 has a son and a daughter; the son is the youngest member of the family and is in K.3 class at the Countryside Kindergarten, while the daughter is in Grade 2 at the primary school. The family has a computer in the master bedroom used mainly for the children's schoolwork. She usually uses the computer with her children; for example, she completes activity-based Chinese and English exercises with her children. Sometimes, the school requires her daughter to use the Internet to source information for projects on selected topics (e.g., hot pot). Her daughter finds games websites advertised in a children's magazine, and searches for them online. She also borrows educational software from the library. Parent 8 plays computer games with her daughter, and has a positive attitude toward computers and her children's use of the technology. She believes computer games help her children memorize English words, spelling, and pronunciation. She also uses the computer to organize digital photos and print them. However, the family does not spend too much time on the computer, as they usually go to parks or bookstores on weekends. The level of computer activity offered by the school was not the major criterion for Parent 8 when she chose which school her children would attend. She considered the whole curriculum of the school when she made her decision.

6.3. 9 Parent 9

Parent 9 has a son and a daughter. The son is the elder brother and her daughter attends K.3 class at the Countryside Kindergarten. She encouraged her children to learn about computers from a young age. She believes that computers are popular in the digital age, and thinks that children should learn how to use them. She thinks children

can learn computer skills easily at an early age. She would rather have her children play computer games than watch television because she believes computers can help enhance her children's spelling and memory. The children displayed intrinsic interest in computers, and were eager to join computer class when they were in K.2. At home, the computer is located in the children's bedroom. Parent 9 allows her children to play computer games freely during weekends. Her children are not allowed to play computer games during weekdays, as she is worried they would become too engrossed in these games. Sometimes her children would argue over who should have access to the computer. Parent 9 often goes shopping and dines out with her children during weekends.

6.3.10 Parent 10

Parent 10 has a son and a daughter, and the latter is the elder of the two siblings. There is one computer located in the master bedroom of the house. It is mainly used by the father who uses it to work on his accounting tasks. As such, the children are only able to access the computer when their father is not using it. In addition, the children are only allowed to use the computer for 30 minutes at a time, and only after they have finished their homework. The daughter is in primary school in Grade 6 and has taught Internet skills to her brother. The children like to browse the school's website together with their parents. They also use e-mail to contact their aunt overseas. Aside from using the Internet, her son also plays computer games, which his uncle bought for him, while her daughter uses the computer for school projects. Although she does not know how to use computers, she agrees that nowadays, children should learn how to use them.

While Parent 10 did not choose her children's school because of the computer activities done there, she appreciates the computer activities provided by the school.

6.3.11 Parent 11

Parent 11 has a son and a daughter. Her daughter is the elder of the two and is in primary school, while her son is in kindergarten. Her son likes to play with the computer alone and does not like it when others disturb him. When the researcher was there, he started to play a computer game as soon as he came back from school and after dinner. The mother did not appear to be worried that her son would become too absorbed in computer games. The son played on the computer for a short time—he played for about 10 minutes and then switched to other activities, switching back and forth between games. The boy's uncle bought him the computer games that he played with. The parents do not place clear regulations or rules on the playing of computer games in the home. However, there was an incident where the son played with a computer game bought by an uncle, which was inappropriate for children. Her son got scared with the violent scenes in the game. The son of Parent 11 started to use computers at an early age. For instance, he used the computer for drawing when he was only three-years-old. He likes playing on the computer and shares what he retrieves from the Internet with his mother. His hobbies include, other than computer games, swimming, shopping, going to the park, and watching television (he likes to watch the science program). Like Parent 10, Parent 11 did not view computer activities as the major consideration when she selected her son's school; she was more concerned about the hygiene conditions of the school.

6.3.12 Summary

Eleven parents at Countryside Kindergarten participated in the interview. Generally, all the parents were positive about children using computers from a young age. Many believed that computers could enhance their children's language development skills, especially in English. The interviews revealed that the computer skills of the parents positively correlated with the computer skills of their children. Generally, the children showed more advanced computer application skills when their parents used the computer daily. All the participants had computers at home. The children used computers mainly for homework, searching for information on the Internet, and playing games. The parents' believed that computers should be used after their children finished their homework and completed their dictation. They also believed that computer games could be used as a fun activity through which their children could enhance their memory and improve their knowledge in Chinese, English, and Mathematics. Some parents said that there is a need for children to learn how to use computers to download music, organize and print digital photos, and search information on the Internet in the current information age. Although the children used computers more in their daily lives and for learning, they showed good self-control and did not appear to be over-involved in computer-based activities.

6.4 Interviews of Children

There were 24 children in the K.3 class of Countryside Kindergarten at the time of the study, and 18 agreed to participate in the study. The interviews with the children took place in the kindergarten, in a quiet corner set outside the classroom. The children were interviewed in four groups, with four to five children in each group. The interviews were conducted in a semi-structured manner. At the beginning of the interview, the children were asked to complete a drawing that represented their understanding of computers. The interviews averaged 30 minutes and were videotaped for analysis. The groups were asked the following questions:

Can you draw a computer for me that shows all the different parts and tell me how they work?

Do you like to go to school? Why?

What do you learn at school?

What kinds of activities in class do you like most? Why?

Are there any activities you don't like? Why?

Do you like computer activities in class?

What do you play during the computer activities?

What kind of computer activities do you like most?

Are there any computer activities you don't like?

Do you like to play computer activities with friends?

Do you think computers help you learn? How?

Do you have a computer at home?

How often do you play with the computer at home?

Do you use the computer at home by yourself or with friends and/or family?

Who showed you how to play with the computer?

6.4.1 Group 1

There were four children, two boys and two girls, in the first group. The interviews revealed the following broad patterns of the children's use and attitudes toward computers at the kindergarten and at home.

1. All students agreed that they were happy to go to school. Most said that this was because they could play with their classmates; however, one child said that he was happy when he played the 'Animal Game' computer game.

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2. All the children thought that they learned from school; for example, two children said they learned general studies, Chinese, English, and Mathematics. Another boy said it was fun to learn English, and another girl said she could learn many new words in school.

3. When asked what their favorite school activities were, the children said they liked new learning materials. For example, one child said he liked the 'Changing World' corner as there were animals flying and swimming. The children also liked challenging computer games. For example, a boy said he liked playing with computer games because there were many exciting games. Another child said he liked playing with the bubble; while the last child said she liked the climbing wall

because she looked like a mouse when she climbed.

4. When asked what their favorite computer games were, the children said they liked challenging and learning-based games. For example, a child said he liked the 'Robber game' as it taught him English. The game would present a picture and a corresponding or related letter from the alphabet. The children also liked being able to choose from a variety of different games, as one child said he liked playing the computer at school because there were many games to play.

5. Children liked interesting and age-appropriate computer games. For example, when asked if there were any computer games they did not like, one said he did not like the 'Animal game' because it did not allow him to walk around. Another child said he did not like the 'Big Mouth' game because it was too difficult, as the player was only given three chances to win.

6. One child said he could learn many things from the computer; another child said the computer was a useful tool to learn English. Another child noted that she liked using the computer to learn English and Putonghua, while the last child said she learned new words when she played on the computer.

7. As all the children had one to two computers at home, they have easy access to a computer. They could play on computers by themselves or with an adult in the

family, when these adults had time. One child said he was able to play on the computer from one to five o'clock every day. One child, who had two computers at home, said she could play on the computer every day after she finished her homework. However, another child could only play on the computer on Saturdays and Sundays with permission from an uncle and aunt. One child was free to play on the computer at any time some days but was restricted to certain times on other days. One child played computer alone and one played with an uncle and aunt if they had time. Another child played computer with his parents and sister. When the children experience a problem when playing with computer, most said that they ask their mother, uncle, aunt, or brother for assistance.

At the beginning of the interview, the children were asked to draw a computer with different parts and to explain how the parts work. Each of the children's drawings appears with explanations in Appendix 7.a. The drawings revealed that these five- to six-year-old children attending the Countryside Kindergarten had a good understanding of the various components of a computer, along with their proper names. For example, Child 1 said there were letters in the rectangular box next to the 'On' button; however, he did not know the proper name of this function. He drew and named a mouse next to the rectangular box and said it was used to control the computer, though he could not explain how to control it.

Child 2 drew a triangular object on top of the square. She explained that the three buttons on the triangle were used as a charger to charge up the computer, and when

the computer was not working, you could press these three buttons to restart it. The 12 circles at the bottom of the drawings represent the people playing the computer. She said the semi-circle in the middle was a chair. She incorrectly labeled the screen, which she represented as a pink rectangular object, calling it a glass instead. There was a mouse linked to the right bottom of the rectangle; however, she did not explain or name it.

Child 3 drew one green and one blue oval object and explained that they were the machines that switch the computer on and off. He said the buttons on the rectangular object in the middle of these two machines were used to play games. He also said the rectangular part of his drawing was a computer, and that it was blue when it was shut down. He also explained that the two wires on top of the computer were used to open the computer so that the computer could be repaired when it did not work. He labeled the computer properly but did not name the screen.

Child 4 drew a keyboard with some letters in alphabetical order on the buttons. She also drew and named a mouse connected to the corner of the computer. She said the computer in her drawing was not turned on, so there was nothing there. Moreover, she could not name the screen properly.

6.4.2 Group 2

Five children, three girls and two boys, participated in this interview. It was evident that this group of children had a slightly different experience of and attitudes toward

computers than the first group.

1. Most children in this group said they liked going to school. They enjoyed activities such as playing, eating, skipping ropes, and climbing. However, when they were asked what they had learned from school, most of them were quiet and only one girl said she learned how to play ball.

2. Most of the children said they enjoyed playing group games such as 'What's the time, Mr. Wolf?' and 'The traffic lights,' though one boy noted that he did not like playing with others.

3. Two children said they did not like the computer activities at school, but one of them said that she liked playing the computer at home. One girl said she did not like playing with the skipping rope and the other girl said she did not like queuing up for when she went to the toilet with the group.

4. When the children recalled which computer games they liked most, only two girls said that they liked the 'Changing World' game. Most of the children said they liked playing with others on the computer.

As with Group 1, at the beginning of the interview, the children were asked to draw a computer with different parts and to explain how the various parts worked. The individual drawings with the explanations of each child are in Appendix 7.b. The drawings revealed that these five- to six-year-old children have a fair appreciation of

what components a computer has and have some knowledge of the proper names of these components.

Child 1 drew and named a keyboard with buttons; however, the buttons did not have any letters or numbers on them. He also drew and named a mouse and could explain that it was for clicking. He drew a rectangle in the middle of his drawings but he did not explain its significance. Child 2 drew a rectangle with some buttons on the sides. She explained the screen was switched on when the buttons were pressed. She identified the yellow rectangle as a keyboard and noted that it was for pressing. She said that she forgot to draw a mouse.

Child 3 drew a human-like object as her computer. She explained there was a human face on the rectangle that represented a human being with two hands by its sides. She said the middle part where she wrote 'K3B' was used for drawing. She could not name the screen properly. She also drew a rectangle in orange and said it was used for pressing the mouse rather than correctly labeling it as the keyboard.

The last child in this group drew a computer with two rectangular objects on both sides. She did not name and explain what they were. The computer was surrounded by some buttons on the frames, but the girl did not name and explain them. She wrote some letters on the screen such as, 'e' and 'a.' She also drew a keyboard with some letters but did not explain the function of the keyboard or name it properly. She then drew a mouse next to the keyboard; again, she did not explain or name it.

6.4.3 Group 3

There were four children, two girls and two boys, in this interview. The interview revealed that this group of children had similar experiences and displayed similar attitudes to the children in the group 2.

1. All children in this group had a computer at home, so they had access to a computer after school. Half of these children could play the computer anytime they wanted to, while the other half needed to ask an adult's permission first.

2. Most of the children spent most of their time playing on their home computer by themselves and half of them were taught how to use the computer by their sisters or parents. One of the children learned how to use the computer by reading the manual. All the children enjoyed playing the computer with their peers at school.

3. Generally, the children liked going to school to play, do class work, and eat. They said that at school they learned how to play the piano, were involved in physical play, singing, and writing and were taught how to be good children.

4. The children said their favorite school activities were computer, physical play, and class work.

5. The children liked game-based computer activities such as the Fishing Game, Robber Game, and Dress Up Game, and said they were fun. On the other hand, they said that they learned from computer games that required them to type letters, as well as card games and drawing games.

At the beginning of the interview, the children in this group were likewise asked to draw a picture of a computer that included all of its components and were told to explain how the parts worked. The drawings of children with explanations are provided in Appendix 8.c. The drawings revealed that the children in this group all had similar understanding of computers. They all drew and labeled the computer and its components similarly.

Child 1 drew a rectangle on top of the computer and said it was a keyboard for typing. He explained the big square in the middle of the drawing represented the computer and he drew some icons on the screen. There was a cursor and he said that it could be moved by pressing the button. He explained that the purple rectangle at the bottom of the drawing was used to open the computer, but he could not name it properly. He also drew a mouse, which he linked to the bottom of the computer, but did not explain its function.

Child 2 drew a square to represent his computer screen but he did not name or

explain it. He also drew a mouse at the bottom of the computer with a plug facing the electrical socket. There was a keyboard-shaped object next to the mouse, but he also did not explain and name it. Child 3 drew a computer in the middle of the drawing. She explained there was a girl dressed up on the screen and there were different tools used for selections surrounding the screen. There was a mouse on a mouse pad linked to a computer wire, but she did not name or explain it. There was also a rectangle with buttons on top of the computer, but again she did not explain or name it.

Child 4 explained that she drew a square with an orange frame to represent the screen of the computer. She also drew a mouse and a keyboard at the bottom of the computer; however, she did not name or explain how they worked. She said the black rectangular box next to the computer was used to turn the computer on.

6.4.4 Group 4

There were five children, three boys and two girls, in this group. The interviews revealed the following broad patterns of the children's use and attitudes toward the computer at the kindergarten and at home.

1. All the children in this group had a computer at home. One child said she had to ask her father for permission before she could play on the computer, whereas one boy said he had to complete his chores at home before he played on the computer.

2. In most cases (with one exception where the mother also taught the child how to play the computer games) the father played with new computer games first so that he could then teach his child/children how to use the game.

3. Most of the children said they played new computer games and browsed on the Internet with their parents; only one girl said that she played the computer by herself. Three of the children said that they liked playing on the computer with others; however, one boy said he had to play on the home computer by himself, as he did not have a sibling.

4. Most of the children said that their favorite computer game at school was the 'Robber Game,' with the exception of one girl who said she liked the 'Animal Game' too. In contrast, one girl said she did not like the 'Three Little Pigs' game. Two boys said that they did not like the 'Robber Game' anymore because they already knew how to win it, and there were no new things to learn. When the children were asked what they have learned through their use of computers, only one boy said he learned English and how to be good.

5. Three of the children said they liked going to school because there were many friends to play with and many things to learn. The other boy said he only liked going to school sometimes because he did not like waiting a long time for a turn on the computer.

6. The children said they liked doing class work and art activities at school. One boy also said he liked the 'Changing World' corner because the teacher always changed the learning materials in that corner.

At the beginning of the interview, the children were asked to complete a drawing with the different parts of a computer, and were told to explain how these parts worked. The children's drawings and the explanations are in Appendix 7.d. The children in this group displayed an attitude toward and knowledge of computers similar to that seen in the other groups.

Child 1 drew a rectangle in the middle of her drawing and named it a computer. Below the computer, there was a keyboard with buttons but the buttons did not have any letters or numbers on them, and the child did not offer any explanation as to what the buttons were or did. There was a mouse linked to the keyboard, and the child explained that it was used to control the computer.

Child 2 drew a rectangle as the computer screen but he did not name or explain it. He then drew some human images on the screen with some other little boxes surrounding it; however, he did not explain what they were. There was also a circle next to the computer, but the child did not name and explain the function of the circle.

Child 3 explained that the orange object on top of the rectangle was used for listening

but she could not give this object a name. She said the rectangular object in her drawing was for showing images but she also did not name it. She explained the other rectangle below the computer was for typing and but she did not identify it as a keyboard. She explained the object next to the keyboard was used for moving the cursor but was unable to identify it as the mouse. She explained that the long objects on both sides of the computer were the wires.

6.4.5 Summary

In conclusion, the Countryside Kindergarten children's drawings and their explanations revealed that kindergarten children are generally familiar with the components of a computer and can graphically represent their understanding of the computer. However, their drawings showed that they had limited experiences in using other electronic equipment that could be used with a computer such as a printer or headphones. Furthermore, they had difficulty using terms such as the keyboard, mouse, speaker, hard disk, and screen to describe the parts of the computer. Some could only name a few parts properly such as mouse and keyboard. Additionally, the interviews showed that the children's ability to explain the function of the different parts of the computer was limited. For example, most of the children were unable to identify the functions of the mouse, keyboard, and screen; although some of them drew some letters on their keyboard. The images the children drew on the screen of their computer drawings showed that they had not had much experience using the computer for functions such as Internet browsing or drawing.

In all of the four groups, most of the children had computers at home. They had limited access to the computer and were generally allowed to use it only with parents' permission and after they completed their homework. At home, the father usually taught the children how to play new games on the computer. Compared with the Beachside Kindergarten, the children of the Countryside Kindergarten were less familiar and less confident with computers both at home and at school.

6.5 Observations

Observations were made of the children at the kindergarten to gain greater insights into their learning. Children were observed for approximately two hours over five days. The activities were video-taped to increase the reliability and accuracy of data analysis of the study. The focus of the observations was the learning scenarios planned by the kindergarten teachers. These include traditional early childhood activities such as physical play, music, art, discussion, and learning corners as well as the computer corner, where educational software was used. In the next section, each learning scenario will be described, followed by a summary analysis. The summary analysis will outline the ways the activities contributed to the cognitive and social learning of the kindergarten children. The ways in which the different activities afforded opportunities for the children to collaborate, as well as the role of the teacher in the learning scenario are of particular interest.

6.5.1 Day 1

Scenario 1: Small group time

The children worked on their class works at their small group tables. As part of their class work, the children wrote Chinese sentences about the winter weather, practiced the sums using the number 10 and wrote the English words ‘salad’ and ‘orange.’ The head teachers supervised the children and assisted them when needed. Most of the children worked quietly at their tables; only a few children chatted with their peers. In the last 10 minutes of the small group time, one of the head teachers, Miss Pat, urged the children to finish their class works as soon as possible. The children were requested to read their Chinese sentences to the teachers before they left their tables and commenced the other activities. Three children finished their class work early, and they were allowed to play with the learning materials on the floor, either by themselves or with peers. One boy challenged another girl with the word card game by asking her if she could read the words. A girl complained that a boy broke her block tower accidentally, but the boy did not apologize. The head teachers did not interfere and continued to help the children who were still doing their class works at the table. Another boy made a sword with some Lego bricks and pretended to fight a boy with it. Two girls were reading stories by themselves on the floor. Miss Pat reminded the children to pack up in the last five minutes of the group time.

Scenario 2: Physical play

The class followed Miss Pat to the playroom, where she stood in front of the class. She asked children that what 'God' has made for us, one girl said 'fish.' She then instructed all the children to pretend to be a fish and to swim around the playroom. She again asked what else God made for us, and one boy said 'birds,' so the teacher told the children to pretend to be birds and fly around the playroom. There was only one boy and one girl who did not fly with other children but instead stayed in their spots. She then told the children that God also made us some 'seeds'; all the children curled up on the floor and pretended to be seeds. She pretended to pour water on the seeds and all the children stretched their bodies slowly as if they were growing. They also stretched their hands up as high as possible. She said there were some fruits on the tree and instructed the children to jump and pick them. She then requested that the children divide themselves into three groups and line up; the children quickly ran and did as they were told. A girl pushed into the queue and stepped on a boy's foot; she told the boy she was sorry three times. Miss Pat asked the children what kind of fruit they had picked. One boy said he had picked some grapes. She asked the other children to raise their hands if they also picked grapes. One-third of the children raised their hands. Another girl said she picked apples; again, the teacher asked the children to raise their hands if they picked apples. Again, one-third of the children raised their hands. Another boy said he picked bananas and one-third of the class raised their hands to say they also picked bananas.

The teacher then instructed the children to sit on the floor while she set up the floor mat for the competition. She demonstrated the rules of the game. The game required

the children to jump on one leg on the single mat and to jump with two legs on the double mats. All the children removed their shoes and formed four groups. Two groups played the jumping game while the other two played on the slides and climbing frames; they were supervised by the other head teacher. The teacher then selected some of the children by tapping them on the head and told them that they were to start the competition. There were six children, three boys and three girls, in the selected group. The two groups stood in front of the first mat. They were clearly excited about starting the competition and they made much noise. The teacher clapped her hands to get the children's attention. The first child in one group started to jump before she was given the instruction to start. The teacher stopped the child and she resumed her place in the line. The teacher then counted to three to signal the start of the game. The children who were not jumping screamed, 'hurry, hurry' to their teammates. Most of the children jumped on the mats according to the rules; however, two children did not follow, and jumped on a single mat with both legs. The teacher instructed the children to play the game again. Both groups completed the game successfully. The teacher clapped her hands and told the children to swap with the other two groups who were playing on the slides and climbing frames. The teacher gave the same demonstration of the jumping game to the new groups. The children who were first in line were excited and started to jump before the teacher told them to. They were then told to go to the back of the line. The children started to jump when the teacher counted to three, and the other children in the groups screamed, 'hurry, go, go.' Miss Pat clapped her hands to instruct the four groups to stop the activities and go back to the classroom.

6.5.2 Day 2

Scenario 1: Role play

The whole class sat on the floor in the classroom. Miss Pat discussed with the children what God made for us, such as light, dark, sun, stars, flowers, sea, and sky. She used props to aid in the discussion. Some of the children raised their hands to show they wanted to act out one of the roles. The other head teacher, Miss Chin, invited a girl to be the sun and instructed her to stand behind the toy corner of the classroom. Miss Pat then invited three boys to be the stars and to hold up the props in front of the class. She then asked the class what else God made for us. A few of the children said flowers, but the teacher did not listen to them. She invited one boy to be the sea. These two children were given the props they needed to act out these roles, and they stood in front of the class. Then, the teacher showed the class the rest of the props, such as the fish and the flowers. She distributed the flowers to two girls, a tree to a boy, and bees to two of the boys. She then instructed all of the children with props to kneel. There were six children left in the class and they formed the audience. The teacher turned off the lights in the classroom and began to narrate the play. Each of the children acted out his/her character to the other children in the class as the teacher narrated. When the story ended, the audience clapped their hands.

Scenario 2: Group time

Using puppets, Miss Chin told a story to the class. Initially, the children concentrated and listened to the story. She showed the children a picture of a wheat farm and taught children the Chinese word for 'wheat'. She then told the children that God made wheat for us to eat, and that we could find wheat in the supermarket nowadays. She showed the children a magic bag with some toy food in it. She invited the children to come and pick a toy food from the bag. A girl picked the toy bread and said that it was made from flour. Then, she stood in front of the class holding the toy bread. She then invited another two girls to draw from the magic bag; they got a pizza and a piece of sushi, which they said were made of flour. They also stood in front of the class holding the toy food. A girl then drew a piece of candy out of the bag and she said it was not made from flour, so she put it in a box next to the teacher. A boy then went to the front of the class and picked a sausage roll from the bag and said that it was made from flour. Another girl was invited to participate in the game but she could not get to the front of the classroom as there was a boy blocking her way, so the boy moved his chair and let the girl walk through. This girl then drew a toy chicken out of the bag and said it was not made from wheat, so she put it in the box on the floor. Miss Chin told the children to play this game by themselves in the toy corner during small group time.

Scenario 3: Class work during small group time

Miss Chin showed the children a worksheet that focused on the concept of 'time'.

The children were required to draw the hands of a clock according to the time set by the teacher on the worksheet. Miss Chin reminded the children that they were all required to complete one worksheet.

6.5.3 Day 3

Scenario 1: Group time

The children gathered in front of the classroom and sat on the floor. Miss Chin introduced a mathematical learning tool to the class by telling them there was a magic bag with some math cubes in it. The children were required to count the cubes according to the number featured on the number cards made by the teacher. Miss Chin demonstrated counting the cubes by 10s. She then picked a card from the magic bag, which had the number 90 on it. Thus, she demonstrated how to count by 10s up to 90 and the children joined in the counting. When she counted to 60, she stopped and asked the children if she was correct and the children said 'not yet' so she kept counting up to 90. She counted the cube sticks in increments of 10 up to 90. She reminded the children to raise their hands so she could check their answers once they were finished.

Miss Chin listed the free choice activities available on the whiteboard. The list included computer, art, small world, and toy corner. Four activities were offered to

the children, including learning tasks, small group time, snack time, and free choice activities. The children worked on the worksheet given to them about telling the time. Some children had their snack at their table. One of the small groups followed Miss Chin and played an activity on the floor. Three boys sat in front of the two computers in the classroom. Two boys paired up to play while one boy played by himself at the computer corner. The two boys played the memory game and the adventure game, both of which are educational games. One of the boys did not know how to start the game, so he looked at Miss Chin, who went to the computer corner and helped the boy begin the game. Afterwards, she walked to the boy at the next computer and showed him which icon he needed to click to start the game. After the boy successfully started the game, she left the computer corner. A boy stood behind the two boys playing on the computer. He watched as they played the computer game, and when one of the boys did not know how to proceed, the boy watching showed him how to continue. A girl also went to the computer corner and watched the pair playing the memory game.

Two boys played the memory game, while another boy played the adventure game. The latter had difficulties playing the adventure game, so a girl from the next table said she would help him. However, the boy said the girl was not allowed to work on the computer because she was not involved with this activity. The boy then left the computer corner. Another girl waited to have a turn on the computer. When it was her turn, she sat down and a boy came and sat next to her. He looked at the other two boys who were playing the memory game. The girl explored the home page of the adventure game. Another girl went to the computer corner, stood behind the two

boys, and watched them play the memory game. Another boy then paired up with the girl to play the adventure game and he helped her by moving the mouse. By watching the boy manipulate the mouse, the girl learned how to play with the mouse. However, one of the boys who played the memory game dominated it and took control of the mouse throughout the game. Another boy pointed to the screen to show the other boy which card matched his selection. The girl then swapped spots with the boy and let the boy control the mouse. Two boys then complained that the pair of boys had been playing the memory game for too long. Meanwhile, some of the children were playing board games on the floor, and some were playing other activities at different corners of the room (such as the toy corner). A boy manipulated his superman doll and ran around the classroom. The teachers did not stop him from running.

Scenario 2: Small group time

A boy and a girl did their class work individually at their table. They were doing a mathematical worksheet that focused on addition. The boy complained that one of the girls took his pencil. Miss Chin took another pencil from the shelf and passed it to the boy. The girl, who was accused of taking the pencil, suddenly turned to the boy and asked him why he kicked her. The boy then held a rubber in front of the girl's eye and said "I pointed to you." The boy scared the girl, who then kept quiet. Miss Chin did not get involved in their conflict as she was helping other children with their worksheet.

Scenario 3: Small group time

Miss Pat led a group of about six children to the playroom to play a game of 'What's the time, Mr. Wolf?' Miss Pat demonstrated how the game was played by acting as Mr. Wolf. The children were excited and screamed aloud. Miss Pat then let the children play the game by themselves to see if the children followed the rules of the game. One boy volunteered to be the wolf and stood with his back to the group of children. The other children asked the wolf, "What's the time?", to which he answered "three o'clock." Then, the other children walked three steps toward the wolf. Then the children asked the time again and the wolf said, "eight o' clock," so they took eight steps. When the wolf said "12 o'clock," all the children ran away to the other end of the playroom. The children appeared to have understood the rules of the game and cooperated with one another as they played the game.

6.5. 4 Day 4

Scenario 1: Small group discussion

Miss Chin led a discussion with a group of nine children. The children were required to pick a topic for the project they were going to create. One of the boys suggested the topic could be hot pot, one girl suggested clay pot rice, and one boy suggested corn and chestnut. Miss Chin suggested that the children take a vote but the children said they could have three different topics. Then, Miss Chin instructed the children to divide themselves into three groups. In their respective groups, the children discussed

the ingredients they needed to cook the food they selected, and the process behind preparing the particular food. Miss Chin gave the children some paper and a pencil so they could list the things they needed to cook their dish. The children used library books to find information about the topics they had chosen. They then wrote down what ingredients they needed. The children worked well in their groups and enjoyed sharing their ideas and the information they gained.

Scenario 2: Computer activity

There were four children playing in pairs at the computer corner. One pair was playing the puzzle while the other pair was playing the word games. Each of the pairs played separately and seldom talked to one another. Three children stood behind the children who were using the computer and talked about how to play the puzzle game. They were not lining up for a turn. The children on the computer appeared to be familiar with the games they played. Although the children sat next to each other, they played the game individually. Each child played for about eight minutes and then passed the mouse to the next child so that he/she could play. The teachers did not enter the computer corner at all.

Scenario 3: Small group time

A boy and a girl were doing their addition exercises at their table. The girl complained about one of the boys, asking him why he harassed her. The boy said that he wanted to use the pencil the girl was using. Miss Pat walked to them and told the boy there were many pencils in the basket, and that he could have another one.

The boy then took a pencil from the basket but appeared to be impatient. However, after two minutes the girl screamed, and quarreled with the boy again. The boy grimaced at the girl and gently hit her face with a rubber. She covered her face with her hands and looked scared of the boy. She then made a face at the boy and appeared to strike him. Suddenly another boy, who sat in front of the girl and next to that boy, helped them stop quarrelling. The teachers did not interfere with the second conflict. Instead, they helped other children with their class work and sometimes disciplined the children.

6.5. 5 Day 5

Scenario 1: Group game

Miss Chin led a group of 20 children to the playgroup for the game of 'What's the time, Mr. Wolf?' She asked the children if they remembered the rules of the game, and they replied that they knew how to play it. Then, she invited a girl to be the wolf; a boy suggested to change the name of the game to 'What's the time, Miss Wolf?' All the children agreed. The girl went to one end of the playroom, where she turned her back and faced the wall. The children asked her, "What is the time, Miss Wolf?" She turned around and said "12 o'clock." One of the boys did not run away but rather, stayed put. The other children ran to the other end of the playroom but some fell on the floor, because they ran too fast. The boy who did not run did not appear to have understood the rules of the game. The children then again asked the girl "What's the time, Miss Wolf?" and she said "six o'clock," so the children walked six steps

toward the girl. Again, they chanted, “What is the time, Miss Wolf?” The girl turned around and said, “nine o’clock.” The children then walked nine steps toward her. The boy who initially had difficulty following the game learned the rules after the children had played a few times. In the beginning, Miss Chin allowed the children to play the game by themselves; however, as the game progressed, she began to help the children stand up if they fell on the floor while they were running.

Scenario 2: Small group discussions

Two groups of children (six and seven in each group) sat on the floor and discussed possible topics for their project. The topic was to be a kind of food. Miss Chin asked them what topic they preferred. A boy from one of the groups yelled they wanted to do corn. A girl from the other group then screamed that they also wanted to do corn. Miss Chin then invited one group Some children in this group suggested making clay pot rice and some of them suggested making corn. Miss Chin then asked Group 2 to choose the topic through a vote. Three children chose corn and four children chose clay pot rice. Miss Chin decided that four of the children could make clay pot rice and the other three children could make corn. The two groups of children applauded the decision. They went to the library corner and took out some of the cookbooks. They read the recipes for corn and clay pot rice in their groups. They talked about which ingredients and cookware they would need and what procedure they would use to make the corn or clay pot rice. Miss Chin decided the project topics when conflict among the children arose. The children had difficulty with some of the words that appeared in the recipes, so Miss Chin taught them the words that they did not understand.

Scenario 3: Computer activity

Seven children were playing at the computer corner. Three children shared one computer and four children shared the other. The children played with the educational software such as a puzzle game, a story game, English words game, and a catch-the-ball game. A boy standing behind a girl playing the story game suggested that she use yellow, red, and purple to color the animal pictures. The girl followed the boy's suggestion. A boy tried to print his picture with a printer. He was afraid and asked the teacher, "Teacher, I printed something but some part of the picture was missing." Miss Pat did not answer the boy and the boy looked very disappointed. A girl sitting next to the boy grabbed his picture and showed it to Miss Pat. Miss Pat just put it on the table and said the picture was fine. A girl standing behind a boy playing with the computer said, "Choose this." A girl sitting next to that boy screamed, "No. " Then, the boy stood up and gave his seat to the girl behind him. He went to the next computer and stood behind the children who were playing that computer. Then, a boy entered the computer corner and stood behind the computer, but one boy objected to the boy standing there, as he claimed that the boy was standing outside the four bricks that they were meant to stand within. The teacher placed the bricks on the floor and instructed the children to line up inside the perimeter of the bricks. The boy who stood outside the bricks went to Miss Chin and told her that the other boy did not allow him to stand at the computer corner and that there was no more space for queing. Miss Chin allowed the boy to stand next to the queue and the children in the queue played together. The children appeared to be

familiar with the computer games and controlled the mouse without any problems. The children playing the computer games appeared to cooperate with one another and took turns playing the different games. The teachers did not pay attention to the children at the computer corner, unless there was conflict among the children, in which case they tried to solve the conflict for them.

6.5.6 Summary of Observations

In terms of cognitive development and learning, most of the activities, except for the computer activities, were teacher-initiated. The whole class revealed that they always followed the teachers' instructions in activities such as physical play, role play, and group time. The children were assigned to work on individual tasks during most of the small group time. Most of the activities appeared to match the abilities and interests of the children (for example the role play, the group games, and the worksheet), yet they were also stimulating and challenging, and encouraged the children to be critical thinkers. It was evident that children liked the group games they played in the playroom such as 'What's the time, Mr. Wolf?' and 'Jump the airplane.' They were excited and showed high levels of participation when they were involved in these games. The teachers placed some educational software at the two computers in the computer corners for these computer activities. The children were able to choose and play computer activities as part of free choice once they finished their class work. The software was game-based and did not relate to the

specific theme of learning that extended or enhanced the children's learning. In addition, the computer's functions were not maximized or extended, as there was no printer or Internet browser. Most children were familiar with the content of the games and played them without the assistance of the head teachers. Two chairs were placed in front of each computer in the computer corner. However, the educational software was not designed for cooperative play. Therefore, some of the children played the games individually and stayed on the computer for a short time. The boys appeared to be more interested in the computers than the girls were. The children said this was their favorite free-choice activity, and there were always children queuing up for a turn on the computer or watching other children do the computer activities. There were limited digital peripherals, such as digital camera, video, and MP3 player, which could have been used as children's learning tools or teacher's teaching aids. Although there was a computer room in the Countryside Kindergarten, the children did not participate in many computer room activities there.

The two head teachers were generally absent from the computer corner in the classroom unless a child had problems starting or continuing a game, or unless conflicts occurred. When arguments occurred between students, the teachers would act and make decisions they believed provided solutions to the conflicts. However, the teachers closely supervised children when they were required to complete academic-based learning tasks such as doing mathematical worksheets or writing words.

The teachers demonstrated most of the activities before the children worked on their

own (for example, the teacher taught the children the ‘Jumping the airplane’ game and the counting sticks through demonstration). The children seemed to understand the content of the activities, although they did not appear to be challenging. The activities were generally highly structured, which provided few possibilities for exploration, and had limited creative opportunities.

In relation to social development and collaboration, the children were provided with limited group activities (as most of the tasks were individual-oriented). When the children were involved in small group activities, they did not cooperate with one another sometimes, had difficulty sharing materials, and conflicts often occurred. When they were involved in competitive physical play (for example when they were playing ‘Jumping the airplane’), the children were found to be less disciplined. However, when they were involved in computer activities, the children displayed improved cooperation with their peers, even though the activities were designed for individual players. The children offered help and suggestions to one another while they played the games at the computer corner. When the children were involved in non-computer-based activities, more conflicts arose. For example, the children fought more when they were doing class work at their tables or playing with board games on the floor. The boys appeared to have less positive social interactions and appeared to be less socially developed than the girls were. As such, some boys disturbed some girls when they were working on their class work. Thus, the girls were found to complain more than the boys did.

The teachers taught in a style that was teacher-centered. They instructed and

supervised children and made sure they finished their non-computer-based class work. The teachers approached the children's learning as a target-oriented process and used the computer for fun time only. Therefore, the teachers were absent from the computer corner during most of the computer activities. For the teaching practice and strategies in the use of computer or digital peripherals, the teachers did not have a specific model. They used traditional learning materials they made themselves. Thus, the teachers did not provide the children with learning experiences that related to the daily life experiences of children in the information age. For example, the teachers could have encouraged the children to browse the Internet to search for the cooking recipes they needed to create their food projects. Furthermore, neither of the two teachers encouraged the children to solve problems; rather they solved problems and conflicts for the children. Additionally, the questioning technique used by the teachers was mainly used to ensure that the children understood the content of the activities, rather than to facilitate the children's higher-level thinking.

Chapter 7

Cityside Kindergarten

Introduction

The summary of statistics report from the Census and Statistic Department in Hong Kong (2006) revealed the median monthly domestic household income of Hong Kong Island residents was higher compared with other areas under the Special Administrative Region. Kowloon was the lowest among the three regions. Three kindergartens were selected, one from each Hong Kong region; all were non-profit institutions. Cityside Kindergarten is operated by a Catholic organization, and is situated in an old public housing zone in the city area of the Kowloon region. Most of the parents of the children who attend the kindergarten's half- or whole-day program work in jobs that place them in the lower socio-economic class. The upper kindergarten class has 26 children taught by one head teacher and one teacher assistant.

The kindergarten primarily uses the thematic approach in the curriculum, and the teachers teach using a few projects each term. In a three-hour session, activities include half an hour of group time with the whole class, one hour of small group time (children are allowed to chose which activities they wish to participate in), followed by one hour of other activities such as music, physical play, English or Mandarin. One head teacher is responsible for group time, and one teacher assistant supervises the children during their small group activities and snack time.

In this chapter, we will present a narrative from the data of Cityside Kindergarten to illustrate how the principal, head teacher, teacher assistant, and the children and their parents enact their educational and learning experience at school and in a family context. We focus on the ways in which computers and other new technologies are integrated into the mainstream activities in kindergarten classes that take place in lower socio-economic areas. We are also interested in the perspectives of the main stakeholders, including the children, and wish to discover how these stakeholders use ICT for teaching and learning.

The data for this narrative were derived from the following sources:

- Interview with the principal
- Interview with the head teacher
- Focus group interviews with 26 kindergarten children in the K.3 class
- Focus group interviews with 12 parents
- Observation of teachers and children
- Documentation such as teaching lesson plan and evaluation, teacher's teaching materials, children's work, and quality of software from educational companies

7.1 Interview of Principal

The interview with the principal took place in the school office. The topics for discussion and questions were organized around the following issues on the views of the role of computer in early chilhood education at the school and how the computers were

used in teaching and learning. Follow-up questions were asked when clarification or examples were needed.

7.1.1 Rationale for Using Computers in the Early Childhood Program and the Importance of Professional Development

The principal said that the kindergarten introduced computer activities into its syllabus in 1998. She believes there is a trend to teach computers as a subject in primary and secondary schools. Therefore, she deemed it important to introduce computers to children during their pre-school years so that they became familiar with computers. In addition, she believed that children had wider access to computers in the information age, and added that many of them had computers at home. The principal also maintained that kindergarten computer activities were important as they provided children with ways to effectively transition from kindergarten to primary school. There was a computer room at the kindergarten used by the children to play with various computer software programs during small group activity time.

7.1.2 Teaching and Learning with Computers in the Kindergarten Classroom

The principal said that the kindergarten installed a learning resource kit (which included a number of educational activities) last year, which came from a local computer company. When she bought this resource kit, she considered its contents and decided

based on which kit was more focused on the subject matter such as Chinese, English, and Mathematics. The learning resource kit has been used since 1998, and the principal thought it was acceptable because both the children and teachers could use it effectively. She believes it can strengthen the children's learning, for example, in the area of counting. However, the teaching resource kit has not been updated since it was implemented because the computer company refused to upgrade the kit for the center. At one point, the principal considered a Singaporean web-based platform called 'Ednoland.' However, she thought it was too complicated for the children and believed that it would take a long time to complete. The principal thought multimedia activities should only be a minor part of the school curriculum because there were many other activities that children did in kindergarten. Therefore, she only encouraged teachers to use the computer for teaching and did not allow the children to use the education software for learning.

The teachers and the principal were both responsible for sourcing appropriate software for the children. When teachers find software they deem suitable, they would discuss it with the principal and determine if the software was appropriate and if it was affordable. If the content and budget are acceptable, the school would buy the software. The school just bought the new Microsoft Windows of 2003 and all computers in the school were installed with Microsoft Office 2003 for both administrative and teaching purposes.

Generally, the principal treated computer activities as a subject, not an interest area. She expressed the view that nursery students are too young to play with computers. However, children of the lower and upper kindergarten classes had one computer lesson

in the computer room per week, which involves one to two activities per session. Moreover, the teachers managed the time they spent on computer activities flexibly. The teachers can reschedule the day they allocate to computer lesson as long as they followed the week's curriculum schedule. Furthermore, they could cater to the needs of the children by giving them extra computer activities when they finish their class work. The principal thought the software did not necessarily have to be related to theme learning; she believed that it was more important that the software captured the children's interest. She thought the software should encourage the children to think, experience different modes of learning, learn a variety of different languages, and develop their listening and visual skills. Although there were many software products in the school and in the market, it was not easy for the principal to find appropriate software. Therefore, when the teachers find appropriate software for teaching and learning, they would discuss its relevance to the class with the principal.

Sometimes, the principal and the teachers would encourage the children to evaluate the computer activities. For example, they were asked whether they enjoyed them and what they achieved from playing these activities. In practice, evaluating each theme and the computer activities took place every year and changes were made if the teachers believed that there were problems with the subject.

The principal indicated that this year, the computers have been placed in the computer room as they have become too old and are due for upgrades. The old computers were moved to the computer corner in the classroom and the new ones were to be installed in the computer room. Thus, the children could play with the computers in the classroom

everyday or whenever the teachers chose an activity that involved computers. Apart from the learning resource kit installed on the machines in the computer room, there was no Internet or additional software installed in the old computers in the classroom. Therefore, the teachers placed songs and CD-ROMs in the computer corner so that the children can play during free-choice sessions.

The principal decided only to install the Internet on the new computers housed in the computer room. She thinks the children have no time to browse the Internet in the classroom, as they spend most of their time in class activities. The principal did not know much about the classroom activities that the children participated in as the teachers rarely shared their plans with her.

The principal agreed that most children had a home computer. She noted that the children's parents often helped them find information about the topics they study. She believed the children would benefit from browsing the Internet for project learning at home with their family. However, the teachers rarely asked the children to find information from the Internet for these projects. The principal thought that the information the children found on the Internet, at home with their families, was more up to date than that found in the textbooks. Thus, the teachers often posted this information on the notice board for the children to share. The teachers noted that they did not have enough time to complete all the activities they wished to cover each day. To maximize the use of computers in school, the teachers allowed some of the children to play with the computers in the classroom and the others to play in the computer room. In addition, the children are allowed to play with the computer in their classroom if they

come to school early.

During the interview, the principal only installed the Internet on the classroom computers, and the Internet was to be used by the teachers only. For example, the teachers could search information on the Internet that they could then utilize when they prepared their teaching content (this often included the design of worksheets and parents' bulletins). The principal said that the Internet has the potential to save time and noted that this was why she liked to browse information on it. However, she said some teachers only used the computer for word processing and noted that these teachers did not necessarily like browsing the Internet, as they believed it was time-consuming. The principal revealed there was a correlation between teachers' personal use of the Internet and their use of the Internet as a teaching tool. In principle, she contended that pre-school teachers should use the computer to assist them with their teaching. However, she emphasized that teachers should not only use the computer to prepare teaching material, but also to give children the opportunity to work in different ways.

Since there was no ongoing computer training for the teachers in school they usually learned by themselves outside the school. The teachers usually used basic computer functions such as word processing, drawing pictures, and making worksheets when they taught the children. For example, one teacher used PowerPoint for a presentation to show to a visiting teacher. The principal said nowadays, teachers must have a basic understanding of computers so that they could use it for administrative work. However, she said that when teachers need to use the computer for teaching, they could get assistance from other teachers. She had a computer at home, which she mainly uses to

send e-mails. She also uses the computer to read government notices, news, and the latest information on the Internet.

Although the school has its own website, its main purpose is to release school news and information about the school to outsiders rather than to internal staff and students. For example, the school posts features of the school curriculum and school developments on the site. No photos or videos of the children are featured on the site. Teachers and parents cannot communicate with the school through the webpage; they use school notices, parents' newsletters, and phone calls.

The principal noted that there was a general trend toward web-based education, but added that the needs of parents varied according to the districts they lived in. She believed that parents preferred face-to-face contact, rather than communication through the school website or a web-based educational platform. Therefore, she thought the school would not install a web-based educational platform in the near future. However, she is planning to install another education platform that can integrate teaching theme and multiple intelligences. She wanted the school to cover the cost of installation and monthly charges resulting from the web-based educational platform, as she was afraid the parents might not understand why such an educational platform was necessary. Thus, she said she would only consider installing the web-based educational platform when the budget allowed it.

7.1.3 Summary

The principal of the Cityside Kindergarten believed that computer activities should primarily be used to assist children in their transition from kindergarten to primary school. There is a computer room in the school, but these computers were too old to run the Internet. The principal noted that the amount of the educational software in the market was overwhelming and remarked that the content of educational software packages released by educational publishers was academic and related to subjects such as Mathematics, Chinese, and English. The principal purchased new computers to be installed in the computer room. She relocated the old computers to the classrooms so that the children could use them daily. She thought children could benefit from gaining information from the Internet. As most of the children had computers at home, the principal thought the children could learn by browsing websites with their parents at home. However, she explained that the school curriculum was very tight, which makes it difficult for children to find time to browse the Internet at school. She also said the content of the classroom-based computer activities did not relate to, reinforce, or extend the class theme or the children's learning, which revealed that the principal has limited awareness of the importance of integrating ICT into early childhood curriculum.

The principal held that pre-school teachers needed to be computer literate for administrative work purposes rather than for teaching. She emphasized that teachers should use various teaching strategies to enhance the teaching and learning of young children. This could include the use of computers, but this should not be the only teaching strategy implemented.

Although there appeared to be a trend toward the provision of web-based education platform, the principal indicated the school did not have a budget. The principal also noted that she did not want the parents to bear the additional cost of such a platform; she said that she would provide the web-based educational platform at a later stage when the school could afford all related costs.

7.2 Interview of Teacher

7.2.1 Head Teacher – Miss Lou

7.2.1.1 The Relevance of ICT in ECE.

Miss Lou thought it was suitable for pre-school children to use the computer, as almost every family and school had computers and access to the Internet. She believed it was important for children to learn about information technology in the information age. She indicated that one of the significant advantages of computers was that people could find endless information from the Internet, and do not need to rely solely on media like books, television, or newspapers. She also noted that the Internet was a useful tool, as it allowed people to keep up with what is happening in the world. However, she explained that there were disadvantages; for example, people did not interact with each other and were seldom able to express themselves verbally.

7.2.1.2 Teaching and Learning with ICT

Miss Lou said that this year, the school started to place computers (with games) in each classroom. She further said that the children could use these computers to play and learn. There was no Internet installed in the classroom computers. However, the children learned how to turn on the computers and played with theme-related computer games during free-choice activity time.

The computer resource kit purchased by the school has been in use for three to four years. Miss Lou said that teachers suggested to the principal that they should use different kinds of computer games rather than the whole resource kit. She also thought that if the teachers were more adept at using the computer, they could set up more computer games for the children that could cater to the children's learning needs.

Miss Lou was not sure if the principal had evaluated the teaching kit. However, the teachers record children's scores when they play computer games. She indicated that she places greater emphasis on how the children manipulated the mouse and whether they understood the commands, as she believes these skills are important. She also explained that most children scored medium marks when they played games. However, if a child scored low in the computer games, the teacher deduces that the child might not have understood the rules of the game. The teachers would then evaluate the appropriateness of the computer games and would inform the principal of their effectiveness during the learning evaluation. The principal would then search for

computer games and software that take into account the general appropriateness of the games and the teacher's suggestions.

Miss Lou realised that the existing computer curriculum which was designed by a computer company, provided teachers with a means to relate computer activities to the curriculum. However, she realized that it was sometimes difficult to relate the computer curriculum to a teaching theme, as the teachers often had a limited understanding of how to integrate computer activities into the curriculum.

Miss Lou also indicated that it was the principal's suggestion to place the old computers in the classroom at the beginning of the school term and to place the new computers in the computer room. As the children only had computer lessons once a week (in the computer room), the principal explained that the teachers should encourage the children to play computer games in the classroom if they were not familiar with a particular game(s). She noted that the children were excited when they played with the computer in the computer room. She suggests that the children should be provided with more games in the computer room.

Miss Lou believes that it is good practice for children to play with the computer in the classroom everyday during free choice activities. The children are allowed to choose the content of the activities they play with on the computer. The learning environment in the classroom was not ideal, as there was only one seat at the computer corner in the classroom; however, children often stood behind the player and watched. She set some rules that governed the use of the computer. For example, she only allows the children

to play one game at a time, but there is no time limit to play with the computer games. The games usually only last for two to three minutes, so the children do not have to wait long for their turn. From her observations, she found no disciplinary problems in the new computer corner, as the rules were clearly given to the children.

Although only one player is permitted to play on the computer at a time (at the computer corner) the children still learned through social interaction, as the children with higher computer skills assisted the children with lower computer skills. This demonstrates how children cooperate when they play computer activities. The children were observed to behave differently at the other learning corners. There were verbal and non-verbal communication, cooperation, and interactions at the other learning corners, whereas there were less cooperation and interaction at the computer corner, as the children would put on their headphones and concentrate solely on the computer games. Nevertheless, when the volume of the headphones was not too loud and the children could hear the suggestions from other children standing behind them, some social interactions took place.

Miss Lou agreed that she expected the computer activities in the computer room to be related to the theme learning. Therefore, the computer activities at the classroom computer corner were treated as fun during free-choice activities time. The children were allowed to choose to play more challenging computer activities when they were familiar with the existing games.

Last year, the school introduced a new curriculum resource book different from the one designed for the computer activities in the computer room. She realized some of the activities in the curriculum resource book did not relate to the theme learning. For example, the principal selected some mathematics learning to be integrated into the curriculum. The teachers preferred to use stories or other teaching aids rather than computers to facilitate the children's discussion of the learning themes. However, when the activities in the curriculum resource book did relate to the theme learning, the teachers would use the computers to extend the children's understanding. The teacher noted that only half of the curriculum related to the theme focus and that the principal planned most of the curriculum, including the computer activities. Other teachers were responsible for music, physical play, and art activities. The teachers found it difficult to complete the whole curriculum in a limited time, particularly when compulsory mathematics and science learning activities need to be finished during small group activity time.

Although the computer activities held in the computer room were viewed as fun and play, the teachers shared the scores from the games, compiled in computer portfolio, with the children's parents. The portfolio also served as a reference for teachers. For example, they would observe and evaluate how and what the children learned. Miss Nam, who supervises children in the computer room, would discuss how the children performed on the computer with Miss Lou. If necessary, the latter would reinforce what the children had learned in the computer room during free-choice activity time, on an individual basis. Aside from these other observations, she also suggested to the

principal that the new software in the classroom's computer corner should relate to the theme learning.

Miss Lou implied that the school did not provide any computer training for teachers. She became computer literate through her study of kindergarten teaching at the Hong Kong Institute of Education. She bought a reference book recommended by her lecturer and learned how to use software such as Photoshop and Freehand. Sometimes, she produced teaching materials in PowerPoint. For example, she used a digital camera to document an excursion with the children and presented the photos in PowerPoint so that the children could be reminded of their visit. Furthermore, she produces worksheets for the children, which are given as extended activities. She also produces other teaching and learning materials and reports using the computer. At home, she browses the Internet to find information to help her prepare her teaching lessons. She said she believes early childhood educators should use computers to assist them with their teaching, not only because computers are a part of most of the children's daily lives but also because computers often help make learning materials more attractive to the children. She admitted that computers were not only useful for teachers but could also be beneficial for people in many kinds of occupations.

Miss Lou also suggested that using a computer to create electronic stories for the children was useful. However, she preferred to have more interaction with the children than using the computer to teach. She liked to read the stories herself so that she could place emphasis on aspects of the story by stressing certain facial expressions and

gaining the children's attention through eye contact.

7.2.2 Summary

Miss Lou noted that the existing computer activities held in the computer room and in the learning corners of the classroom were not wholly integrated with the theme learning. The principal organized most of the curriculum except for music, physical play, and art. However, the teachers would evaluate computer activities and non-computer activities and suggest improvements to the principal. Computer activities played in the computer corner served as a play activity and helped reinforce what the children had learned from computer activities in the computer room. The children were allowed to play different computer activities in the computer corner, according to their interest and ability. Computer learning was not assessed, but the teachers recorded the children's scores in their portfolios and shared this information with the children's parents. She observed that more computer activities were needed if the children's interests were to be satisfied. She noted that the children collaborated more when they did computer activities than when they did other non-computer activities. The setup of the computer room in the classroom benefited the children, as they could play with the computer during free-play time. They could also play whatever interested them. In terms of teaching preparation, Miss Lou produces teaching materials using various software that she learned to use by reading reference books. She documented the children's learning process using digital devices such as digital camera. She concluded that computer literacy was a trend in the teaching profession and was an

important part of her work.

7.3 Interviews of the Parents

Parents of the children were invited to participate in focus group interviews held in the school after school hours. There were two groups of six parents each, for a total of 12 participants. During the interview, the parents were asked questions about their children's use of the computer in and out of school hours. The opinions and attitudes of the parents are important here. The interviews were video recorded, with parental consent, to aid in more accurate data analysis.

7.3.1 Parent 1.

Parent 1 has two children. The elder son is in primary school and the younger one is in K.3 at kindergarten. Both love going to school. Parent 1 thought the children were interested in learning via the computer and believed that computer games were fun for children. She also believed that computers encouraged the children to learn, as they reinforced learning through good feedback. She did not want her children to become addicted to computers, so she made an agreement with them whereby they could only play with the computer at home once a week. She did not teach her children how to browse the Internet, as she was worried that they might come across inappropriate websites or accidentally delete files. However, when the children's teachers assigned

them homework that required them to search information on the Internet, she showed her children how to search on the Internet, explaining the steps and processes in detail. Although she found that her children had great interest in new computer games, she believed other kinds of play might also attract her children's attention. Her children would keep asking for help when they encounter new challenges in the new computer games. She would read the instructions with the children, as they were eager to know how to play them. She purposely placed the computer in the living room so she could monitor her children when they played. She said her youngest child would follow his brother and play with the computer even though he was not interested in playing at that particular moment.

7.3.2 Parent 2.

Parent 2 has two children. The elder son attends primary school and the younger daughter attends year K.3 at kindergarten. They both enjoy going to school. She commented that she did not buy computer games for her children; rather, she bought educational computer games that she thought would be of greater benefit to her children's learning. Her children seldom talk to their mother about playing with the computer, except when they score high marks in computers at school. She also had the computer in the living room so she could monitor what her children were playing with. Parent 2 frequently went to mainland China with her children during holidays, which meant that children did not get many chances to use the computer for entertainment.

7.3.3 Parent 3.

Parent 3 has one daughter in K.3 at kindergarten who loves going to school. She agrees that kindergarten children should learn through new information technologies. She believed her child learns and memorizes new information at school. She noted that her child loves to play with computer and that she exercises self-control in the activities she engages in. However, she often allows her child to play on the computer as a reward when, for example, she performs well in school. She said she disciplines her child if she breaks any of the rules she has set related to the computer. She noted that her child would sometimes be so engrossed in what she is doing when she plays on the computer that she would forget everything else. Parent 3 found that her child enjoyed doing 'exercises' more when she used a computer (as apposed to traditional worksheets), as the rewards were more instantaneous and the process was much more interesting. She thought the children could learn words from computer activities. Nevertheless, she was concerned about radiation from the computer and the fact that it might damage her daughter's eyes. Thus, she installed a screen filter on the computer to protect her child when she watches the computer screen for a long time. In addition, she agreed that the computer should be placed in the living room at home so she could monitor her child when she plays on the computer.

7.3.4 Parent 4.

Parent 4 has two sons and one daughter. The elder son and daughter are in junior high

school and the younger son is in the K.3 class at Cityside Kindergarten. Her children love going to school. Parent 4 uses the computer daily to read and to search for online mathematics games and stories for her children. The websites she selected were mainly in Chinese, but sometimes they were in English. The children were allowed to use the computer after they finished their homework. Often, however, Parent 4 would negotiate the rules she set in relation to the children's use of the computer with her children. Moreover, she suggested that adults should check the websites before they allow their children to browse online, particularly if the website was new. She emphasized that she browsed together with her children the first time they used the Internet.

After she selects a website for her children, they are allowed to choose a game to play. Her children found the games on these websites challenging; however, she said computer activities at school were academic and often easy. She observed that when her child was interested in a particular game, he would play it more effectively. She thought he took more initiative on the computer than when he participated in other non-computer activities. For example, her son appeared to be keener to play on the computer than do his homework. Moreover, she was proud of him, so she bought educational software from the market designed for children aged seven to nine. Although her child was only five years old, he could play them easily. Thus, she encouraged him to be literate by supporting his use of computer games. Even though she only demonstrated how to use a digital camera to her child once, he knows how to use it. She believes that the school's philosophy, in relation to computer-assisted

learning was consistent with the needs of today's society. Although her child enjoys going to the library to listen to the stories read by the computer there, she usually goes swimming with her child because story reading in the library is too time-consuming.

She also agreed that the computer should be placed in the living room rather than in the child's bedroom. She believes it is better to have the computer in the living room, as she wants to know what her child is playing with on the computer. However, she emphasized that it was not appropriate to watch what her children were playing, as she feared that it might break the trust between her and her children. The news that game losers usually commit suicide when they cannot accept loss worried her. She was concerned her child would not be able to cope if he loses a computer game. However, with her coaching, her son could now cope with ease. In addition to playing on the computer, her child likes swimming and going to the library to listen to the storybooks being read.

7.3.5 Parent 5.

Parent 5 has a daughter who attends K.3 class at Cityside Kindergarten. She noted that her child loves to play with computers and that she loves going to school. Her child tells her parents when she scores high marks at school, which is in keeping with the practice of other children. Her child loves to read storybooks and often requests to be read to. Parent 5 would only let her child play on the computer for one hour at a time. She usually browses one website with various games and lets her child choose games by herself. She observed that her daughter likes these games. Similarly, the computer was placed in the living room because there was no space in the bedroom. Moreover,

she could watch over her daughter while she was playing with the computer.

7.3.6 Parent 6.

Parent 6 has a son in the K.3 class at Cityside Kindergarten. She supports the idea that kindergartens should introduce new information technologies like computers to children. She believes this could broaden her child's realm of experiences and motivate her child to complete the worksheets he is given in school. She purchased a computer for her home and placed it in the living room because she wanted to keep an eye on her child when he played computer games. She realized that once she turned on the computer, her son would run to her. She found that when she browsed on the Internet she discovered a lot of information. Thus, she was worried that if her child was not supervised when he browsed on the Internet, he might be exposed to some inappropriate information. Although she realized that once she turned on the computer, her son would join her, he also frequently did other things like reading books. When she chooses computer games for her son to play, she chooses games with an educational element, like those used in the school. In addition, she bought games that she thought would help her son improve his learning, such as games that provide academic exercises or taught other languages like Mandarin. She always reminds her son that it does not matter if he loses a game, as he could always try again. She believes that if children used the computer appropriately, specifically under parent's guidance and supervision, it would not affect their social life or decrease their interest in school.

7.3.7 Parent 7.

The family of Parent 7 migrated from Mainland China and she has a daughter who attends K.3 at Cityside Kindergarten. Although she has not purchased a computer for her home, her child plays with the computer at her cousin's house. She usually limits the time on the computer to less than an hour at a time. Her child often plays games with her cousin at her cousin's house, but she does not know what kinds of games her child plays. Her aunt taught her and her cousin to use the computer. However, she noted that her child was very interested in computers and liked playing on it. She does not use the computer as a reward to encourage her child to complete her homework. She said that her child still remembers the stories she told when she studied in China. When she was in China, teachers physically punished the children if they did not complete their homework. Thus, her child would complete her homework and show a high level of self-discipline. She agreed that children remember things better when they enjoy the activity. For example, her child likes watching television and could memorize the elements of the shows she watches and the times they are on. Aside from playing with the computer, her child likes watching cartoons on television and learning English.

7.3.8 Parent 8.

Parent 8 has a son who attends K.3 class at Cityside Kindergarten. She disagreed with the view that children should experience information technology from as early as two years of age. She was concerned that the computer might hurt children's eyes. She believes children should learn to use a computer from five years of age. She realized that in today's society, our lives are changing technologically and that we need to use

machines more. Hence, she agreed that children should learn to use a computer as early as kindergarten. She admitted it was fun to play with computer games but was concerned that the radiation would hurt the children's eyes. Therefore, she would only allow her child to play with the computer for 15 minutes at a time. She also believes the computer provides a means to acquire information and that it can help motivate children to learn. She complained that some kindergartens forced children to learn by making them write. She observed that children were more motivated to complete writing tasks on a computer rather than with a paper and pencil. Her husband taught the children that computer was not just for playing but also for acquiring information, communicating, and building knowledge. Nevertheless, she does not allow her younger child to browse the Internet, except when he watches his elder brother. Although she stressed that children were more disciplined when they played with the computer, she recognized that there had to be some rules. Some children could not control themselves if raised by other family members such as grandparents, and she takes her parenting role seriously. She read in the news that the computer was sometimes related to family violence, which concerned her greatly.

She placed their computer in the living room so that she could monitor her children when they browsed on the Internet. She installed some screening and anti-virus software to stop the children from viewing inappropriate websites. She noted that it was sometimes difficult to filter all these websites. Therefore, she preferred to search the Internet to find appropriate websites for her children to look at before they went on the computer. Furthermore, she suggested that parents should check their children's Internet browsing record using the history function on the computer. She argued that it

would not violate the child's privacy if they were under the age of 18. She recommended that parents should purchase educational software from a quality source that offered a guarantee. Lastly, she indicated that her children shared their activities with her. She seldom uses the computer daily because she is not interested in playing games and she only browses the Internet for information when necessary.

7.3.9 Parent 9.

Parent 9 has one elder son who attends K.3 class at Cityside Kindergarten and a younger daughter. Her son started learning how to use a computer when he was in K.1 class. He told her when and what he played on the computer with his peers. Her son taught her how to use the computer. She learned when she helped him complete his homework on the computer. She strongly agreed that it was appropriate for kindergarten children to be introduced to information technology and that they could start playing computer in K.3. She thought that playing with a computer would help the children's thinking skills and would foster their fine motor development. Her younger daughter has a variety of hobbies. Her son was least interested in Chinese writing because of the complexity of strokes. She believes that the computer helps kindergarten children complete their homework. She bought some educational software for her child from bookshops. Although most software are produced locally and are primarily in English with Chinese translation, she was satisfied with their quality. She observed that her son was more curious and more interested in doing various exercises on the computer and that he would tell her how he performed in these games, especially when he won.

She also said her son would ask for assistance if he encountered any problems when he played computer games. However, she would only allow him to play with the computer for less than one hour at a time on weekends and during school holidays. She found that he was very self-disciplined and would turn off the computer when his time was up.

She believed that computer was a way to acquire information and that it aroused children's motivation for learning. She found her son was happy irrespective of whether he won or lost in a computer game. Thus, she noted that he found his exercises more interesting on a computer rather than on a worksheet. Significantly, her child was not as frustrated when he makes mistakes on a computer than when he makes mistakes on the worksheet. When he makes an error on a worksheet, he would request to do his work all over again. In addition, she believed that playing with a computer could improve children's memory as her son could remember procedures for using a computer.

In their daily lives, she reads online news when necessary, and her husband plays on the computer at home after work until three o'clock in the morning. Since there was limited space at home and thus she could monitor what her child was playing on the computer, she placed the computer in the living room. Furthermore, she installed screening and anti-virus software to protect her child when he used the computer. She did not set any guidelines in relation to her child's use of the computer and allowed him to browse the Internet for his homework. Her child turned off the computer after he finished his homework. She said she would prefer her children to attend a school that

has computers.

7.3.10 Parent 10.

Parent 10 has an elder daughter who attends primary school and a son who attends K.3 class at Cityside Kindergarten. She concurred with other parents who said that kindergarten children could start learning computer around K.3. She thought adults her age would find it harder to learn new things, especially on a computer. She admitted that she learned her computer skills by accompanying her children when they played on the computer. She took turns playing with her two children and when one person lost a game, it would be the next person's turn. She found that her son's self-confidence improved when he played with computer and noted that he was willing to follow rules. For example, she encouraged her son to try again when he lost a game and taught him that it was a good thing to take turns when you played a game. She also realized that the communication between herself and her son improved after they purchased the computer as he responded when she encouraged her son to try again when he lost a computer game. However, she set a rule that specified that her children could only play with the computer after they finished their homework, and she noted that they often finished their homework faster when she rewarded them by allowing them to play on the computer. She also found that the computer helped facilitate communication between parents and the school and that she would prefer her children to attend a school with computer activities.

7.3.11 Parent 11.

Parent 11 has a granddaughter who lives with her and who attends K.3 class at Cityside Kindergarten. She thought that if children started to play with computers when they were too young, it might affect their learning in other areas. Therefore, she did not allow her granddaughter to play with the computer at home on school days, as she was afraid that if adults did not supervise her, she would play the computer excessively. She made an exception for school holidays. She was also worried that if she played the computer too much she would not do well in school. She preferred to spend time reading books and studying with her granddaughter, as she believed children liked to be accompanied in activities they did. She insisted that she would only use the computer with her granddaughter when she needed to retrieve information from the Internet for her homework. She believed that given the age of her granddaughter there was not a great deal of information that she needed. She agreed her grandchildren could learn the computer through trial and error.

The computers at her home were placed in her sons' rooms because they were grown up. She did not know how to monitor her son's computer and Internet use, as she knew that her son's computer skills were much better than hers are. She was afraid that it would violate her sons' privacy if she used the computers in their rooms. She never learned how to use a computer, but her sons browse web pages and download them for her to read. They also taught her how to move around the computer screen. Since her sons learned how to use the computer when they were in high school, and given that they did not have a computer at home, she did not give them any guidelines to follow in relation to computer usage. Computers do not have a great impact on her daily life, but she

agreed that she would like the school to offer computer activities for her grandchildren in the future. She believes that children would learning computers from adults at home and it could be an opportunity for children to learn and experience new things at home.

7.3.12 Parent 12.

Parent 12 has three children. One daughter and one son attend primary school and the youngest, son, attends Cityside Kindergarten. She agreed that in the information age, the new generation needs to be up to date with technologies like the computer so that they could perform better in life. Thus, she prefers her children to attend a school with computers. She thought it was important for the school to offer computer activities in teaching so that the children would be prepared for society. Moreover, she thought it should be the main goal of the school to teach children how to use computers and how to use the online dictionary for spelling and finding words. Although she admitted that children would be happier when they use computers to learn, she limits the amount of time her children are allowed to play on the computer to one hour a day, and stated that they are only allowed to play after they finished their homework. Her children also enjoy playing on the computer with peers, when the games require two players. She reminds her children that they have to rest after they play with the computer. For example, she advises them to walk away from the computer and view things at a distance to relax their eyes.

Parent 12 placed the computer in her daughter's room and disagreed that it was a problem to place the computer in her children's room. She frequently checks the

'history' of her daughter's Internet use to see the websites she had been visiting. She said she only allows her children to click icons they need to complete their homework. She was worried that her children might accidentally gain access to pornographic websites. She said her children had interests aside from playing with the computer, like watching cartoons, playing superman, and playing with their toys. Academically, she found that her sons had a higher interest in mathematics. Therefore, she would help them search mathematical games on the Internet and download them for her children. She learned to use the computer by browsing the Internet with her youngest son. She said she would buy computer games for her children if she had money; alternatively she would download them from the Internet. When she buys games from the market, she would ask for assistance from her uncle if she did not know how to install them. She was not confident about fixing the computer if she encountered any technical problems. She definitely believed that the computer improved her daily life. However, she was worried about the impact that games would have on her children, particularly when they lost.

7.3.13 Summary

Twelve parents from Cityside Kindergarten participated in the interview. The parents agreed that in the 21st century, children should be kept up to date with computers and other technologies. They believe that computers could help elicit a child's interest in learning as well as their motivation to learn. Computers are treated as a reward, as the children were only allowed to play on the computer after they finished their homework. Most parents placed the computers in a communal area, as there was often inadequate

space in the bedrooms. However, all parents said they monitor their children's use of the computer to prevent them from viewing pornographic websites. They did not think that checking the records of websites visited by their children was an invasion of privacy. Moreover, they limit their children's playing time, usually to the maximum of one hour. They emphasized that the computer should only be one of the children's hobbies. All of them would like their children to attend schools that provided computers for learning. The parents usually learned how to use the computer from their children by accompanying them when they used the computer to complete their homework. The parents generally used the computer to read online newspapers and to search for information for their children's homework. They concluded that computers had a positive impact on their daily lives.

7.4 Interviews of Children

There were 26 children in the K.3 class of Cityside Kindergarten and 18 agreed to participate in the study. The children's interview took place in a multi-purpose room of the kindergarten separated from the other classrooms to allow for a quiet environment for the interview. The children were interviewed in three groups of six children each. The interviews were conducted in a semi-structured manner, and at the beginning of the session, the children were asked to complete a drawing that represented their understanding of computers. The interviews were videotaped (with consent from parents) for analysis, and each interview averaged around 30 minutes. The following questions were asked of the children in the groups.

Can you draw a computer for me that shows all the different parts and tell me how they work?

Do you like to go to school? Why?

What do you learn at school?

What kind of activities in class do you like most? Why?

Are there any activities you don't like? Why?

Do you like computer activities in class?

What do you play during the computer activities?

What kinds of computer activities do you like most?

Are there any computer activities you don't like?

Do you like to play computer activities with friends?

Do you think computers help you learn? How?

Do you have a computer at home?

How often do you play with the computer at home?

Do you use the computer at home by yourself or with friends and/or family?

Who showed you how to play with the computer?

7.4.1 Group 1

Four girls and two boys were in this interview and it revealed that this group of children had different experiences and attitudes.

7. Five of the six children in this group had a computer at home, so they had access to computer outside school hours. One-third of them reported that they could play with the computer on holidays.

8. Half of them played computer games with their siblings at home most of the time. Most of them learned how to use the computer from their sisters or parents, except one who learned how to play by reading the manual, and another who learned how to use the computer at school. They said they enjoyed playing the computer with their peers at school because it was more fun than the other activities.

9. When asked what their favorite school activities were, the children replied that they liked the slides, the wooden pony, running, and playing catch and tag. One child disliked music lessons; most of them reported that they liked all the activities in school.

10. The children liked going to school because they could play with different activities and toys.

11. Most of the children liked computer games such as Pseudo Citizen, Digital Dinosaurs, and Fighting Monsters. They said these games were exciting. One of them said he liked game-based computer activities such as Tokyo Majoh, as he could connect with other people via the Internet and could beat

them. In addition, most of them thought they could learn from computers. A couple of them said that they learned by using e-mail, going online, and from playing with computers in general.

At the end of the interview, the children were asked to draw a computer with different parts and were told to explain how the parts worked. The individual drawings and their explanations can be found in Appendix 9.a.. The drawings revealed that these five- to six-year-old children of Cityside Kindergarten had a good understanding of the various components and functions of a computer. However, most of the children could not name the components properly. Child 1 drew six circles on the screen representing the six clouds of a computer game. She also drew a mouse linked to the bottom-right of the screen and named it properly. She explained that the orange rectangle was the filter of the screen at home to protect the computer from being damaged. She said a pencil scratched her computer at home. She also drew a keyboard, which looked like an object with some letters on it. She did not explain or name the keyboard.

Child 2 explained that the black square in the middle of her drawing represented a computer. She wrote some letters and numbers on it and said that she typed the letters of her name. She also drew a speaker next to the computer and named it properly. She indicated that there were two buttons on the speaker so that the volume could be adjusted. She explained that there was a mouse linked to the bottom-right of the computer and named it.

Child 3 drew a square and explained that it was the screen of the computer. He drew a child next to the computer and said he wanted to play with the computer. The squares under the computer were the keys of a keyboard. He did not explain the mouse-like object that appeared between the computer and the child in his drawing.

Child 4 also explained that there was a drive at the bottom-left of the computer that was used for inserting DVDs, which, in turn were used for playing games. He said the human-like object represented a 'superman' who was fighting with a monster. Child 5 drew two rectangles with letters and numbers on them. The numbers were not in sequential order. She explained that there was a set of headphones next to the happy faces and said that she could hear sounds when she wears the headphones, but that she could not speak with the headphones. She did not name the parts of the computer, including the headphones.

Child 6 drew five ovals vertically, which represented the main menu of the computer activity that she played with at the computer center at school. She explained that the rectangle at the bottom-right was the icon, which was the 'back' to a previous page. There was a mouse linked to the left of the computer but she did not name or explain it. She also drew a keyboard-like object with some letters on the top row, but the order of the letters was not the same as on a real computer.

7.4.2 Group 2

One girl and five boys were in this interview and revealed that this group of children had similar experiences and attitudes to those of Group 1.

11.4 Five of the six children in this group had a computer at home. Only one of them can play with computer after he finished doing his homework.

11.5 Most of them were allowed to play on the computer by themselves at home most of the time. Some of the children also played on the computer with their parents or siblings. Most of the children were taught how to use the computer by their parents or relatives. Only one child taught himself the computer and one child learned it in school. They said they enjoyed playing the computer with their peers at school, as they felt that it was fun.

11.6 All the children liked going to school and found it fun.

11.7 When asked what their the favorite school activities were, the children said they like to sing songs, read story books, play with friends, play the computer, and eat. One child disliked the torn toys at school, most of them like all the activities at school.

11.8 Most of the children liked game-based computer activities such as Rolling Balls, Releasing Balloons, and Archery, and said they were exciting. One of them liked the Monopoly game. On the other hand, they disliked difficult games as well as

games with unclear purpose. In addition, most of them thought they could learn from computers, and specifically said that they could learn painting and drawing from the computer. However, a couple said that they could not learn from playing the computer.

At the end of the interview, the children were requested to draw a computer with its different parts and to explain how these parts worked. The individual drawings of Group 2 and their explanations can be found in Appendix 9.b. The drawings revealed that these five- to six-year-old children at Cityside Kindergarten had a good understanding of the various components of a computer and the function of these components. However, most of them could not name the components accurately. Child 1 drew a cable that ran from the computer to the keyboard. He explained that the black rectangle was a frame to support the computer. He drew a mouse connected to the bottom of the keyboard and explained that it controlled the computer. He did not name the mouse. He also said that the rectangular shape with boxes was used for typing, but did not call it the keyboard.

Child 2 drew two computers in her work. She explained that the top one with a pink frame was a real computer and the bottom one in yellow was a fake computer. She said you were supposed to press the numbers on the green rectangle. However, she did not call it a keyboard. She also said you were supposed to insert playing disks into the purple rectangle. Again, she did not name the hard disk. She said there was another object used to insert disks into, and that this object sat on top of the computer.

Child 3 wrote ‘XP’ in the top-right corner of his drawing and said this was the name of his computer. The rectangle on the right was used to store game disks. He explained that the colorful rectangle was used to play games, but he did not identify it as the keyboard. He also said the white rectangle on the left was used for sound, but did not identify this object as the speaker. He finally explained the red circle represented the headphones, which he said were used to listen to the sounds.

Child 4 drew a green rectangle that represented the frame of the computer. He explained that the pink boxes were the keys for playing games. There was a mouse next to the keyboard, which he named correctly. He drew a $100 note next to the computer and said it was used to shop for computer games.

Child 5 explained that the gray rectangle on the right was used to adjust the volume but he did not know its name. He wrote the value of the computer as $1 and the mouse as $5. He said the pink rectangle with boxes was for pressing, but again he did not know its name. He drew a person who sat in front of the computer. Lastly, he said the yellow circle in the bottom-right corner of the computer was used to switch it on, and said it was activated when pressed.

Child 6 explained that he drew a rectangle with ‘DVD’ on it, which was used for pressing the buttons when he inserted a games disk into the computer. He said if you want to play games, you need a disk. He wrote some letters and numbers on the keyboard but was not able to name the keyboard. He also explained that there was a paintbrush in his picture used for drawing.

7.4.3 Group 3

Again, there were six children in this interview, four girls and two boys. The interviews revealed that this group of children had similar experiences and attitudes toward computers to the children in the other two groups.

1. Four of the six children in this group had computers at home, so they had access to computers outside school hours. Half of them played on the computer on weekends and holidays.

2. Half of them were allowed to play on the home computer by themselves most of the time, while half play on the computer with their parents. Most of them were taught how to use the computer by their siblings or cousins, except for one child who said that he learned how to use the computer in school.

3. The children liked going to school because they like to play on the computer. They also liked to play with their classmates and having snacks.

4. Their favorite activities at school were playing on the computer and physical activities. Some students like all of the activities in school. Some students disliked reading storybooks because they said the procedures were complicated.

5. Most of them thought they could learn from the computer. They noted that they could learn things such as Mathematics, English, Chinese, and concepts like loud and soft.

Similarly, at the end of the interview, the children were asked to draw a computer with its different parts and to explain how the various parts worked. The individual drawings of Group 3 with the explanations are in Appendix 9.c. The drawings again revealed they had a good understanding of the various components of a computer and the functions of these components. However, most of the children could not name the components properly. Child 1 explained that the square represented a computer in his drawing and that there was a robot in his computer. He said the rectangle below the computer was used for pressing the buttons but he did not name what it was. There was a mouse connected to the keyboard, which the child said was used for pressing, but again he could not name it.

Child 2 called the green rectangle a keyboard and said it was used for pressing. He said the buttons at the bottom of the screen were used to switch the computer on and off. He also explained that he drew a cordless mouse and that when the mouse was clicked, he could play some games.

Child 3 explained that the object on top of the computer was a camera used to watch people but she did not know its proper name. She drew a keyboard and a mouse in her picture but did not explain them.

Child 4 said there was a kitchen on the screen of his computer. He pointed to the center of his picture and said it was the screen. He said the triangle supported the computer but he did not name it. He said he drew a mouse with a sticker you were meant to click on the top of the mouse. He named the mouse correctly. He said the rectangle at the bottom was used for typing but did not name it.

Child 5 explained that there was a math game in her drawing. She wrote 1-1, 10-100 on the screen and said these represented subtraction equations. She drew a mouse connected to the left side of the computer and named it properly. She said the mouse was used for clicking on games; for example, if she was required to answer math questions in the game, she would use the mouse. She introduced a green object on the right, which she said was a set of headphones that was used for listening to sounds.

Child 6 explained that the blue rectangle on the left was used to listen to sounds but she did not name it. She pointed to the blue rectangle and said she inserted some disks in it. She said a human object was on the screen of her computer. She drew a keyboard below the computer but did not mention it.

7.4.4 Summary

In conclusion, the drawings of the children of the Cityside Kindergarten and the children's explanations of their drawings revealed that generally, they were familiar

with the components of the computer and their functions. They gained this familiarity by playing with computers at school and at home. The children also represented different components of the computer graphically. Their drawings showed they had limited experiences using other electronic equipment such as printers, scanners, and webcams. Furthermore, they were less able to name such components as the keyboard, speaker, hard disk, or screen. However, all of them could name the mouse properly and were able to describe how it worked. Additionally, they appeared to have had more experience playing games on the computer at home and had little experience using the computer for learning activities in school. Thus, their computer use was not maximized and they did not explore other functions such as the Internet browser or the drawing function.

7.5 Observations

The children at the kindergarten were observed to gain greater insights into their learning. The children were observed for approximately two hours over a period of five days. The activities were also videotaped to increase the reliability and accuracy of the data analysis and of the study. The focus of the observations is learning scenarios planned by the kindergarten teachers. These included traditional early childhood activities such as physical play, music, art, discussion, and learning corners, as well as the computer center outside the classroom. In the following section each learning scenario will be described, followed by a summary analysis to address the

ways in which the activities contributed to the cognitive and social learning of the kindergarten children. Of particular interest are the ways in which the different activities afforded opportunities for the children to collaborate. Additionally, the role of the teacher in the learning scenario was important.

7.5.1 Day 1

Scenario 1: Computer lesson at the computer center

The head teacher told two groups of children to play computer activities at the computer center. The first group consisted of four boys and two girls. Miss Lou turned on the computers and opened the main content of the activities of the computer resource kit before the children entered the computer center. The children sat in front of the computer individually and put on the headphones by themselves. Miss Lou instructed the children to choose games from the different disciplines that appeared on the screen, such as Chinese, English, and Mathematics. Miss Lou recorded the children's score on a mark sheet when they finished. One boy raised his hand and told Miss Lou that he completed all of the games. Another boy told Miss Lou that he wanted to play the game again and Miss Lou asked him which game he was playing and if it was an English activity. However, the boy pointed to another activity on the screen. Miss Lou

finally responded by saying that he could choose the activity he liked.

One boy said he wanted to play the Mathematics game again and Miss Lou asked him if he would like to play another game instead and he agreed. Miss Lou suggested that he could choose to play Chinese, English, or Mathematics game. He chose Mathematics and Miss Lou told him he could play more than one game. A boy sat next to him and looked at his screen when Miss Lou told the boy who was playing that he did very well. She suggested that the boy play another game. A girl called out that the game she was playing was very funny and that she liked it.

Miss Lou walked to another boy and asked him to pick the Chinese word for 'sister.' The boy clicked on the right answer. Miss Lou praised him by saying 'Good boy' and rewarded him for his correct answer by saying he could play one more game before he returned to the classroom. Miss Lou asked a boy what he was playing and the boy responded that he was playing 'Chinese 2.' Then, Miss Lou asked another boy to find the Chinese word for 'mother' on the screen, he pointed to a picture of 'father' on the screen. Miss Lou repeated her question. The boy used the mouse to click on the right answer this time.

A boy sat in the middle of the group and clicked an icon to log out of the game. Miss Lou asked a boy if he wanted to play the game again and he nodded his head. Miss Lou allowed him to play it again but he clicked on another icon that led him to a different game. Miss Lou asked him why he wanted to play a different game before he finished the first game he was playing. A girl shouted that she scored 10 in a

Mathematics activity. Miss Lou instructed her to leave the game. Another boy told Miss Lou that he was playing ‘Mathematic 2’ and said he did not want to play it again. Miss Lou instructed all the children to line up and leave the computers once they were finished the game they were playing, as the time for computer activities was over.

Another group of four boys entered the computer center. They sat in front of different computers and put on the headphones by themselves. Miss Lou instructed them to pull out the keyboard. One boy complained that his headphones were not working, so Miss Lou checked the speakers of his computer and asked him if he heard any sounds. He nodded his head. Two boys shared the games they were playing. One of them shouted happily that he scored 10 in the game and raised his hand so that Miss Lou would come and check his score.

The other boy said he only scored nine; Miss Lou comforted him and told him that he had done well. Another boy, who sat next to him, said he scored 10 and that he wanted to leave the computer center. Miss Lou did not allow him, but instead encouraged him to play another game. Another boy suggested that he play the game ‘English 1’ but he said that he did not want to. Another boy showed that he was interested in playing the game ‘English 1’ but Miss Lou reminded him that he should play ‘Mathematics 1’ first.

7.5.2 Day 2

Scenario 1: Computer activity

Six children were playing English and Mathematics games in the computer center for their assessment. In the English games, three pictures and one English word were shown on the computer screen, and the children needed to match the word to one of the pictures. Miss Lou recorded their score after they finished the game. All the children watched the computer screen individually and showed high levels of concentration. Miss Lou taught a boy to read the word 'READ,' which was shown on the computer. Another boy shouted the word 'JUMP' aloud. Miss Lou praised him and instructed him to switch to the Mathematics games. He clicked on the mouse and played the Mathematics games, but he clicked the wrong game. A boy corrected him by pointing on the screen and showed him how to correct his mistake by clicking back to the main menu and selecting the Mathematics games. Miss Lou then told the children that if they had finished their games they could take off the headphones. Then, a boy took off his headphones and shouted excitedly that he had scored 10. Miss Lou asked another boy what he scored in the English games. He replied that one time, he scored zero and another time he scored eight. Miss Lou asked him again about his score in the Mathematics games, and he replied that it was nine. Another boy sat near the doorway and shouted that he was done with the games. Miss Lou asked him what his score was, and he replied that it was nine and asked her if he could leave the game.

However, Miss Lou requested that they needed to wait for the other two classmates who were still playing their games. A girl raised her hand and told Miss Lou that she finished the game. Then, Miss Lou instructed the children to leave the computer and line up at the doorway. The last boy raised his hand to indicate that he had finished the

game. Another group of six children played computer games in the computer room. Miss Lou instructed the children to put on their headphones when they were ready. One boy did not know where to click to activate the games, and Miss Lou assisted him by showing him how to click the game 'English 2.' Another boy also shouted that he did not know how to play 'English 2,' but Miss Lou asked him to try by himself. A girl was not sure how to play 'English 2,' and was helped by a boy who sat next to her. Then she got the correct answers. She screamed happily when she won the game. A boy explained that he earned one mark and said the game was too easy. Another boy said he scored eight in 'English 2.' The children then switched to the Mathematics games. A boy said he played 'Mathematics 2' but he asked the child next to him if it was in English. Miss Lou then encouraged him to listen to the game first. Another boy was proud of his success as he won 'English 2' and he said it was very easy. Miss Lou found a boy stuck in the game. She asked him if he understood how to play the game or if he was having trouble with the headphones. She then helped him put on the headphones properly. When the children finished their game, they raised their hands and waited for Miss Lou to record their scores. One boy yelled that he could not play the game, so a boy taught him to how to get the answer by clicking a red hat. After she recorded the children's scores, Miss Lou instructed them to leave the computer center.

Scenario 2: Small group activities

The children were divided into different groups and were allowed to play at different

learning corners in the classroom. They chose which learning corner they wished to play in according to their interest. Three teachers assisted the children with different small group activities. A group of children played at the science corner. A boy picked up some seeds and put them into a tube and, then another boy played with a plastic 'water ball.' The topic of the science corner was 'Touch.' The children were meant to learn by touching different kinds of materials such as rocks, seeds, and mud. A girl wore 3D spectacles and looked for someone to play with her. A boy sat on the floor and played the puzzle game by himself. A group of six children played with a puzzle together on the other side of the floor. One group played at the home corner with the cooking toys. A boy ate a snack by himself, and looked around at his other peers playing at the corners.

Scenario 3: Music activity

The whole class had their music activity in the music room. They played the 'statue' game. When the teacher turned the music on the CD player, the children were requested to move around on a green mat. When the music stopped, they were meant to 'freeze' their bodies. Children who moved would be out of the game. The teacher played the game with the children for about three minutes, after which they clapped their hands. Then the teacher asked the children to pair up with a partner. They sang the song about 'touching different body parts' and when the song finished, the children touched the body parts of their partners. They sang the song twice and the teacher instructed the children to sit in a circle on the floor. The teacher held a tambourine and told the children that she would pass the tambourine around once the music started.

Then the children were asked to pass the tambourine to the next child within the circle. When the music stopped, the child who held the tambourine would say the name of one kind of food, but the children were not allowed to repeat the name of the food that another child had already named. The teacher turned on the music and the children started to pass the tambourine around the circle. Some children hit the tambourine, and some shook it. The teacher stopped the music and the boy holding the tambourine called out papaya. The teacher turned on the music again and the children continued to pass the tambourine around. The teacher stopped the music and the boy who held the tambourine called out egg. The teacher started the game again and a girl who held the tambourine named beef noodles when the music stopped. The teacher told the children that the time for music activity was up and instructed them to line up near the doorway. The children followed the teacher and went back to the classroom.

Scenario 4: Group games

Thirteen children were accompanied by Miss Lou to the multi-purpose room, where they played the game 'Simon says.' In the beginning, Miss Lou placed 14 chairs in a circle and introduced the game to the children. The children did not understand why there was an empty chair. Miss Lou demonstrated the game. She encouraged the children to listen to the instructions carefully and to respond by sitting on a different chair as quickly as possible. The children began by standing outside the circle. When she said 'Please move if you have ears,' then all children quickly stood up and chose a different chair, within the circle, to sit on. One girl did not move. Miss Lou

explained that she was ‘out’ of this round. Miss Lou started the game again by saying ‘Please move if you have eyes.’ All the children stood up and began finding different spots to sit on. However, two boys who stood up were not aware that there was still an empty chair available until their peers told them excitedly, and then one of the boys quickly sat on it. The boy who did not get a chair to sit on was ‘out’ of the game. Miss Lou praised the children, for they were willing to help each other. The children showed that they understood the rules of the game. One boy suggested that the class should play the game by themselves. Miss Lou agreed and allowed the children to lead the game. A boy said ‘Please move if your surname is Lee.’ Three children with this surname stood up and moved to another spot. The other children were excited and some of them stomped their feet on the floor as they watched the other children change their positions in the circle. The child who was out of the game gave the next instruction. He said, ‘Please move if your surname is Wong.’ Then, four children stood up and quickly changed their spot. Since there were no other children out of the game, Miss Lou said she would give the next instruction. She said, ‘Please move if your surname is Lam.’ Two children quickly stood up and moved. Miss Lou told the children to play the last round because it was packing up time. She said, ‘Please move if your surname is Fung.’ Only one child stood up and changed to another spot. Miss Lou praised the children for their cooperation and asked them if they liked the game. They responded that they liked it very much. Miss Lou said they could play the game again if they finished their class work quickly when they returned to the classroom.

7.5.3 Day 3

Scenario 1: Computer activity

Six boys were in the computer room, playing with the English and Mathematics games. They each sat in front of a computer and put on their headphones by themselves. They watched the screen with great concentration. They started the game 'Easy English' and clicked the icon to activate the game. The children were required to match three words to the right picture. Miss Now observed that a child did not know how to read the word 'Read' on the screen, so she came to him and taught him the word. A boy next to this child read the word 'Jump' and shouted aloud. Miss Now praised him for getting the right answer and wrote down his score in her record book. She walked around the children until a boy raised his hand to indicate that he had finished the game. She walked over to him and checked his answers. The boy was very happy and satisfied. She checked on the other boys and noted that they all completed the games correctly. She instructed the boys to play the Mathematics games. A boy clicked on the mouse and started the game, but one of the boys clicked on the wrong game. He corrected himself immediately by pointing to the right game on the screen. Then, this boy clicked back on the main menu and changed his selection. They concentrated well when they played with the games. Miss Now told the children that if they finished the game they could take off the headphones. Another boy took off his headphones and shouted, 'Yes, I got 10 marks.' Miss Lou wrote down his score quickly and asked another boy his score again as she forgot it. This boy replied he scored a zero and an eight. Miss Lou asked him what he had scored in the Mathematics game, and he replied, nine marks. She recorded his score. A boy sat near the door shouted, 'Finished.' She asked this

boy his mark, he said nine, and asked if he could leave the computer room. She then asked all children again if they had finished their games and instructed them to leave the computer room.

Scenario 2: Small group activities

A group of seven children comprising four boys and three girls, were doing their writing work. Most of them were concentrating on their work except for one boy who turned around and watched the children at the back make toys with recycled boxes and materials. However, when Miss Now walked near him, he continued writing. Another boy raised his hand to indicate that he finished his writing. Miss Now stood opposite him and pointed to the English writing words 'fire' and 'firemen,' and then asked him to read them once. He read them loudly and correctly. Then, he closed his writing workbook and put them back in his school bag. A girl who sat next to him was writing the word 'fire' and 'firemen' as well. She used two fingers to measure the spaces between each of the words.

Four children were at the back of the classroom. Two of them were doing their writing work and the other two were choosing which recyclable materials to use to make their favorite toys. When a girl selected an empty biscuit box another girl quickly grasped the box back and said, 'I brought it to school.' She put the box to the girl's mouth and pretended to eat the biscuits. A boy showed the two girls that he had chosen a small chocolate box. The girl said, 'let's play together after I finish my writing,' and the girl

agreed. Initially, Miss Lou tried to walk to them when she heard their conflict but kept quiet when they solved it.

Another five children were at the next table drawing their favorite shops with different coloring pens. A girl tried to copy some Chinese words, such as good shelves, toilets, cashier, and storeroom onto a paper with words printed on it. A girl shouted to Miss Lou that she was correctly copying words written on the paper onto her drawing. The next boy was coloring a drawing of a shop with pastels. The rest of the children were all still drawing the outline of their shops.

The teachers pinned up posters that pictured different shops such as fast food restaurants, supermarkets, and boutiques on a white board. The white board was also used to separate the home corner from the mat area. A girl was playing with the cooking toys in the home corner and told a boy that he could not join her. The teachers placed toy food and baskets on the table in the corner. A girl enjoyed playing with the materials in the corner by herself and she cut some food using the toy cutlery. Miss Now stood outside the corner and asked the girl if she could make her some noodles. She said, 'ok' and started making it happily.

Three boys went to the table with different recycled boxes. One boy quickly put a few empty ice cream cups into a bigger box. Then, he said, "I'm finished." Miss Now walked to him and said, "Let me see." She opened the box and asked the boy, "Do we need to put them into the fridge? " The boy agreed and said, "They are all for you. " Miss Now thanked him.

Scenario 3: Computer activity

Seven children, two girls and five boys, were in the computer room. Six children were wearing headphones when they played the games on the computer, but one boy stood at the back of another boy to watch him play. Miss Lou encouraged a boy to play another game but he said he wanted to play one more game before he changed to another game. Another boy raised his hand and asked for Miss Lou's help, as he could not enter the game. Miss Lou comforted him and told him to log out from the existing page first. He clicked the icon to logout but asked Miss Lou again, "Is it here?" She told him to log into the 'Mathematics 1' game. He tried but he still could not select the right game. Miss Lou encouraged him to log out again and to try to find the correct game. He then logged out and finally clicked on 'Mathematics 1.' Another boy raised his hand to ask for Miss Lou's help. The next boy also said he was lost. Miss Lou instructed them to log out and log in again. One boy raised his hand to tell Miss Lou that he had finished the game. Miss Lou asked if he wanted to play it again, but he refused. However, the boy next to him said he wanted to play the same game again. Miss Lou asked if he wanted to play the English game again but he pointed to a different game, which was Mathematics-based. Miss Lou tried to persuade him to choose another game such as Chinese or English, but the boy still preferred to play the Mathematics game. Miss Lou praised a boy performing well in the game he was playing. The boy next to him watched his computer and Miss Lou told him he could play another game. A girl shouted that the game was funny and she liked to play it. Miss Lou asked a boy which one was the sister. The boy clicked on the right answer; Miss Lou praised him and told

him that he could play one more game before they went back to the classroom. Miss Lou asked another boy which game he was playing. He replied that he was playing Chinese 2. Miss Lou requested that he point to the word 'Mother' but the boy pointed to 'Father.' Miss Lou repeated her question, and the boy clicked the right answer. Miss Lou asked if he wanted to play again. He nodded his head but he chose a different game. Miss Lou stopped him and reminded him that did not finish the last game. A boy told a girl that he was playing Mathematics 2 and the girl said she was playing the same game and that she had 10 marks. Then Miss Lou allowed the girl to leave the computer room and the boy said he did not want to play again.

Scenario 4: Computer activity

The last group, which had four boys, entered the computer room. They put on their headphones by themselves. Miss Lou instructed them to pull out the keyboard. One boy said he could not hear any sound from his headphones. Miss Lou checked the speakers and asked him if he could hear any sound and the boy nodded. Another boy told the boy next to him which game he was going to play. The next boy said he wanted to play the railway model. One boy said excitedly that he had 10 marks and raised his hand so that Miss Lou could check his marks. Another boy said that he had only nine marks and Miss Lou praised him. The boy sitting next to him said he had 10 marks and raised his hand to ask Miss Lou to check his marks. Miss Lou confirmed that he played the game correctly, and the boy said he wanted to leave the computer room. However, Miss Lou said he had to stay and play another game. One boy called out that he could play English 1 but added that he did not really want to play

English 1, but would if he had to. Miss Lou said, “Ok, you can play it.” However, when another boy indicated that he wanted to play English 1, Miss Lou repeated that he should play Mathematics 1 first. Miss Lou then instructed the children to start packing up in two minutes.

7.5.4 Day 4

Scenario 1: Computer activity

Three boys and three girls were in the computer room. Miss Now instructed them to sit in front of the computer and put on their headphones. She then told the children that they could start with any game they preferred. A boy shouted repeatedly that he wanted to play Chinese 1. He clicked on the Chinese 1 icon and played the game, which was a coloring competition game. Two boys talked to each other about which game they were playing. A girl asked Miss Now if she needed to press ‘Enter’ on the keyboard. Miss Now told her to try by herself and she pressed the ‘Enter’ key. Another girl raised her hand and told Miss Now that she had four marks. Another boy shouted proudly that he had nine marks. Miss Lou recorded these marks on the assessment sheet. Miss Now asked a boy what his score was but he did not respond so she walked over to him and taught him how to read the score.

Another boy raised his hand and asked Miss Lou to check his task. He told her that he had 9 marks and had 11, 10, and 9 at different times. Miss Lou told the children that they could play one more game if they finished the games quickly. Most of them followed Miss Lou's instructions except one boy who was playing with his headphones. A boy asked Miss Lou which game he should play, she told him to listen again and encouraged him to find a game by himself. Two girls sat next to each other and were sharing information about the games they were playing and they looked at each other's screens. One boy was not sure which game he should play; Miss Lou walked over to him and showed him how to start the game. Two girls finished their games early and they asked if they could play some more games. Miss Lou told them it was time to go back to the classroom, so the children took off their headphones and lined up near the door of the computer room. They went back to the classroom one by one.

Scenario 2: Small group activity

A group of five children with three girls and two boys were working at the table. They were drawing a poster for their visit to 'Toys R' Us.' Some copied the Chinese words for 'visit' and 'Toys R' Us' from the whiteboard. Some were drawing pictures on the posters, meant to represent the focus of the visit. Only one boy cut toy pictures from the 'Toys R' Us' catalogue and pasted them on his poster for decoration. All of them wrote the date of the visit and their names on the poster. A boy passed a bottle of glue to a girl who wanted to paste pictures onto her poster. Another boy held up a piece of paper and asked whose paper it was, and another boy responded that it belonged to the teachers. Then, the teachers reminded the children that they should pack up in five

minutes. Then, one boy started packing up by placing the crayons in the basket.

Scenario 3: English activity

The English teacher entered the classroom. The children sat on the chairs and sat in a circle, but Miss Lou stayed outside the circle. The English teacher sat in the middle and held up a big book. She started to read the word 'fire engine' and asked the children its meaning. The children did not listen to her. Three boys stood up and moved around waving their hands to indicate that they wanted to answer the question. Miss Lou stopped them and encouraged them to listen to what the English teacher said. The English teacher pointed to the picture of the fire engine in the big book. The children appeared to be frustrated with the theme of fire engines, so Miss Lou went into the middle of the circle and demonstrated the movement. Some children started to make the sounds of a fire engine. Then, the English teacher instructed the children to stand up and to pretend to drive a fire engine inside the circle. They followed her instructions and moved around the circle. The English teacher praised their good performance and instructed them to go back to their seats. They went back and she tried to teach them the word 'run' but the children lost concentration again. Some of them ran toward the English teacher who sat in the circle. Miss Lou reminded these children that they should behave nicely. Then, they went back to their spots. The English teacher sang the song 'Old McDonald' and the children stood up and tried to do the movement along with the song. At the beginning, all children could follow the song but later on, some of the children were just hanging around doing nothing. The English teacher told the children that the game was finished and said goodbye to them.

Scenario 4: Mathematics game

Miss Now accompanied another group of 13 children and played the Mathematics games with them in the multi-purpose room. She held up two hoops and showed the children that they were for the games. The children were standing in front of Miss Now when she introduced the rules of the game. She told the children that one hoop represented a number. When she said two numbers, the children were required to stand inside the hoop that represented the number that was called. She demonstrated by saying 'three plus four,' then the two groups of children with three and four in each group were required to go into the hoops that represented the numbers three and four . The children appeared to understand the game. Then, Miss Now instructed the children to stand back and she placed the hoops on the floor. She said the numbers 'four plus four' and the children quickly jumped into the hoops without counting. A boy who stood inside a hoop invited a girl to join in as he found that there were not enough children in the hoop. Miss Now asked the children how many of them were inside the hoop, but they did not answer. Then, Miss Now invited another boy outside the hoop to count together with her, but some children said seven and some said eight. Miss Now suggested that the children vote to determine the right answer. Five children voted for eight and three children voted for seven. Miss Now counted the number of children in the hoops by touching their heads. She then confirmed the answer was eight. Those who voted for eight were excited, as their answer was right. Miss Now said 'four plus five' and the children rushed into the hoops. When they realized that the right number

of children was in the hoop, they stood firm. Miss Now, together with the children, counted the number of children in each hoop. They appeared to be happy when they got it right. Miss Now said 'six plus seven' and the children rushed into the hoops quickly. A girl counted the number of children inside her hoop, then, a boy in the next hoop counted the number of children in his hoop. When Miss Now counted the total number of children in one of the hoops, the children in the next hoop became very excited and asked Miss Now to count how many people were in their hoop. When the children realized that they had the right answer, they jumped and laughed happily.

7.5.5 Day 5

Scenario 1: Music activity

Miss Lou took the class to the music room. They took off their shoes outside the music room and clapped their hands as they lined up to enter the room. Miss Lou instructed the children to stand in a circle. She shook her hands to the music and most of the children followed her movement except for a few boys who lay down on the mat and rolled their bodies. Miss Lou stopped them and asked them to watch what the others were doing. They went back to the circle and Miss Lou said the circle was not big enough. Then, the children had to hold hands with their neighbor and stand back a few steps to enlarge the circle. Miss Lou danced with the children by raising her hands in the air, stamping feet, and turning around. Miss Lou then instructed the children to hold hands again and they all started to walk sideways to one end of the room in time with the music. Some of the children were walking so fast that they could not hold

their peers' hands. Miss Now joined and guided the pace.

Miss Lou instructed the children to follow her actions such as kneeling down, touching her head, touching the ground, and clapping her hands. The children followed her step by step and followed the movements happily. Miss Lou started to revise a fruit song with the children. She read fruit word cards together with the children. She reminded the children to change the name of the fruits in the song, so they sang the song and suggested one kind of fruit for the song. Miss Lou asked if anyone wanted to be the conductor. Some children raised their hands to show their interest. Miss Lou took out different kinds of musical instruments such as a tambourine, shakers, piano, and clippers. The children were asked to choose their own musical instrument. Miss Lou picked up a paper stick from the ground and asked if any of the children wanted to be the conductor. Many of the children raised their hands to show their interest, but Miss Lou selected a boy to be the conductor. He stood in front of the group. Miss Lou explained to the group that when the conductor points to a child, all of the children with the same instrument as the conductor should play their instruments together. All of the children were required to stop when the conductor pointed to the floor. Miss Lou asked if the children were ready to start the game. Miss Now played the music on the CD player. The first conductor pointed to different children and other children with the same musical instrument played the instrument along with the music.

After the first conductor played three times, Miss Lou asked him to stop to let other children have a turn. She selected a girl to be the second conductor and told all of the children they needed to stop playing when she pointed to the ceiling. Miss Now

played the music again and started to instruct the children. All of the children followed her instructions. Miss Lou then selected a boy to be the third conductor. This time all of the children needed to play their instrument when the boy placed the pointer in front of his body. However, the children did not pay attention to the third conductor and were just chatting among themselves. Miss Lou told the children this was the last round of the game and that they had to follow the conductor. The children regained their focus and followed the instructions of the third conductor.

Miss Now told the children that the music session was up, and asked them to pack their musical instruments and form a queue. They sang the goodbye song while they packed up.

Scenario 2: Small group activities

Eleven children were doing their homework in two groups, one group of seven and another group of four. Two boys in the first group were talking to each other and were not concentrating on their written work. Miss Lou was walking around in the classroom and did not interrupt the children until she found three girls doing nothing. She placed a plastic tablecloth on a table at the back of the classroom and told the girls to do their homework on that table. The girls realized they needed to do their homework, so they sat down at the table and started writing.

Three boys in a group were making a robot out of recycled boxes. One boy held the robot so that it did not fall down and the other two were tearing off bits of scrap paper

and pasting them on the robot. A boy wrote his name on a sticker and placed it on the robot. Miss Lou walked over to them and praised their good work.

A boy at the writing table stood up and started to pack up. Miss Lou walked over to him and pointed to his Chinese writing. She asked him to read the word once before he packed up. He read the word correctly. There was a boy writing the Chinese word 'toy' slowly; Miss Lou walked over to him and held the pencil with him and they wrote together. Some children who finished their work earlier placed a mat on the floor in the middle of the classroom. They played together with the construction toys. Three girls were hanging around in the classroom after they finished, so Miss Lou asked them to help pack up. They used a cloth to clean the writing table. The other two children cooperated and folded up a tablecloth with the help of Miss Lou. Both Miss Lou and Miss Now praised the children for their assistance with the packing up.

Scenario 3: Snack time

The children went back to the classroom after washing their hands after going to the toilet. They queued in front of the whiteboard to wait for their towel boxes. They took out their boxes and brought their belongings back to their seats. They then got a plate each from the container on the table and walked back to their seats. Miss Lou wore disposable gloves when she distributed the food to the children. There was one helper on each of the tables who went to get a bottle of water and brought it back to the group. Miss Lou helped the children distribute the water. The children poured the

water into their cups. Miss Lou told the children their snack was a bun and distributed the food to each child. Miss Now stood in front of the group and guided them in prayer before they started eating. The children followed the actions of Miss Now and prayed loudly. The children were chatting quietly with their peers as they ate. They placed dirty cups and plates in a container on the floor. Then, they put their towels away in a box and back in their school bags.

Scenario 4: Showing the robot

While the children were waiting for the school bell to ring, Miss Lou suggested they play with the robot that they had constructed. Twenty children sat in front of the whiteboard. Miss Lou invited two boys to go to the front and introduce their robot. Miss Lou helped them by asking them if they finished making the robot. They replied that they were not yet done. Miss Lou asked which part they had not finished and the boy said the legs. Miss Lou then pointed to the bottom of the robot and asked if those were the two legs. The boy said the legs could not be fixed onto the body of the robot. Then, Miss Lou asked how they could make them better. They said they could make the legs larger so that the robot could stand. The school bell rang and the children went back to their seats and waited to go home.

Scenario 5: Computer activity

Six children, one girl and five boys, were in the computer room. The children sat in

front of the computer individually with their headphones on. Miss Lou clicked the English activity before they entered the computer room. They were required to select a picture that matched a particular English word, such as walk, read, sing, jump, or play. Miss Lou walked over to a boy and told him how to play. When the boy finished the game, she asked him what his score was. The boy next to him showed him that he had eight marks, but the other boy said he only received three marks. He did not continue the game when he noticed that Miss Lou was not watching him. He quickly left the game and went to the main menu. Then he looked at the boy next to him and imitated him by playing the game Mathematics 2. He clicked the Mathematics 2 icon, but he did not understand how to play it, so he just looked around. Miss Lou realized that the boy was having problems so she showed him how to play. Miss Lou watched for a while until she found that he could manage the game by himself. She told the children to tell her their scores before they left the computer room. The children exited their games, returned to the main menu, and then took off their headphones. They then returned to the classroom.

Scenario 6: Small group activities

The children were asked to do their English writing, which required them to write the English words, ‘wind’ and ‘blows’ and to write numbers from one to 90. There was a thematic map of ‘Japanese restaurant,’ which the teacher mapped out with the children on the whiteboard. The children wrote the concepts on the map in Chinese. The teachers placed picture books about food near the map. The home corner was

decorated with posters depicting different kind of restaurants and some word cards showing the favorite food of family members. The library corners were placed next to some storybooks about food.

Eleven children were sitting on two tables doing their writing. Miss Now and Miss Lou were supervising their writing while a student teacher assisted two boys with their reading. Five boys were eating their snack at another table. They chatted sometimes as they ate. Miss Lou walked over to them and told them to concentrate on their eating.

Scenario 7: Computer activity

Six children, one girl and five boys, entered the computer room. Miss Lou cleaned their hands with hand wash spray before they sat in front of the computer. They rubbed their hands with the spray and sat down in front of the computer individually, wearing the headphones. Miss Lou instructed them to click on 'English 2,' which is a matching game that teaches children English words such as play, run, jump, read, and sing. The children were required to match the English word that appeared on the screen with one of the pictures that also appeared on the screen. When the girl did not know which picture to match with the word 'read,' the boy next to her hinted that she should pick the picture he was pointing to. She looked at his screen and then focused back on her own computer.

7.5.6 Summary of Observations

In terms of cognitive development and learning, it was observed that all activities were task-oriented and teacher-centered. The children were usually requested to complete tasks set by the teacher in an allocated time, which meant that there was limited opportunity for the children to extend or enrich their learning. For example, from the observations of the computer activities, the children were assessed according to structured computer activities not integrated into thematic learning. Significantly, the computer activities were drill-and-practice-type games that limited the children's exploration and creation of learning. Although the children were familiar with the mouse and headphones when they played the activities in the learning resource kit, there was no other computer equipment such as a printer or scanner to extend the depth of their work with the computer. The children were only allowed to play with the structured activities from the computer software curriculum. Some of the children did not understand the content of the computer activities. In particular, they had some difficulties playing the English games, which showed that their reading and listening skills in English were limited. Similarly, it was noticed that the children did not understand the English teacher's instructions well. There was a need for the head teacher to translate and explain the instructions in their own language. However, most of the children appeared to enjoy the Mathematics games and had high scores in these games.

From the observation of some of the small group activities, it was noticed that the children were asked to complete some of their class work before they were allowed to play at different corners in classroom. Most activities were completed individually, which discouraged collaboration between the children, and limited the amount of social contact the children experienced. They did not appear to be actively involved in collaborative work and did not extend their ideas and learning in different ways. Sometimes, the children were provided with group activities that involved music and/or physical play. The children appeared to enjoy these activities and collaborated well when they participated in the group games, despite the fact that the games were not integrated with their thematic learning.

The role of both the head and assistant teachers in the computer activities was that of assessor rather than facilitator. They did not use teaching strategies to enhance children's critical thinking and problem solving except during some of the project time when they were allowed to construct their learning through different activities such as drawing, reading, and discussion. The children's work showed they had learned the basic concepts taught to them through the projects selected by the teachers. It was observed that, given the chance, the children had the potential to investigate and explore more widely and deeply, the concepts presented to them in the form of the projects. Consequently, the children could obtain first-hand learning experiences through visits to places and excursion. They could then present their ideas and the knowledge they gained from these experiences.

Chapter 8

Discussions and Reflections

Introduction

This final chapter draws together the main findings of the research and considers the data derived from various sources, including surveys, interviews, class observations, and even children's drawings on their perceptions of computers. Findings are synthesized and issues are addressed in relation to the research questions posed in Chapter 1, Section 1.4.

1. How do principals, teachers, and parents view the role of computers in early childhood education in Hong Kong?
2. In what ways do teachers plan for use of computers in their early childhood programs in Hong Kong kindergartens?
3. How is the use of computer integrated into the curriculum in early childhood kindergarten in Hong Kong?
4. What kinds of learning are evident in the computer and in the non-computer activities in Hong Kong kindergartens?

Findings from this study contribute to our understanding of the contemporary uses of ICT in Hong Kong kindergartens in relation to issues posed based on the study's aims and research questions. The study was guided and limited by them. From these contexts, the final part of the chapter will consider recommendations for future research directions in relation to the effective use of ICT in early childhood education in Hong Kong.

8.1 Overview

This study investigated the role of ICT in the learning of children in kindergartens in Hong Kong. Mixed methods research design was used wherein case studies were embedded in a quantitative survey approach. Qualitative data derived from the case studies assumed supportive roles based primarily on quantitative data obtained from the survey. The survey was conducted to describe the features of the computer environment that were considered important to stakeholders, as well as to explore the integration of computers into the curriculum for Hong Kong kindergartens. The descriptive case studies then aimed to follow through with an in-depth investigation to support the broad data gathered from the survey. A complete description of the three cases of Hong Kong kindergartens using ICT in their teaching methodology have been provided in Chapters 5 to 7. This study assumed a social cultural view of learning that regards learning as occurring in a social and cultural context; thus it should be necessarily considered when discussing aspects of learning among children.

8.2.Discussion of Main Findings

This section presents the main findings related to the research questions in Chapter 1, Section 1.4.

8.2.1 The role of Computers for Hong Kong Kindergartens as Viewed by Principals, Teachers, and Parents

This section presents salient information derived from surveys, case studies, and interviews with regard to Research Question 1:

How do principals, teachers, and parents view the role of computers in early childhood education in Hong Kong?

Data that was considered in detail in Chapters 4 to 7 is summarized herein with regard to three broad areas of interest.

Computers are important and essential to children's lives

Data from the surveys, interviews, and case studies, revealed that principals, teachers, and parents had similar views about the role of ICT in early childhood education.

Most of them felt that ICT is both '*important and essential'* to the lives of children, which they regarded as being dramatically changed by and in today's digital age. They believed that computers could enhance different developmental areas of the children's lives, especially with regard to memory skills via drill and practice type software, and extend their children's knowledge in Chinese, English, and mathematics.

They noted that children in contemporary Hong Kong frequently use computers to download music, organize, and print digital photos for entertainment and to search information on the Internet. This view aligns with that of Prensky (2001) who suggested that children in the technological age are 'digital natives' who frequently play with media-rich opportunities, thereby possessing developed skills in digital domains through their continuous and spontaneous engagement with a variety of digital devices. Comments by parents are also consistent with literature (e.g., Buckingham, 2007; Yelland, 2007; Yelland & Kilderry, 2005), indicating that the lives of children are now infused with a wide range of ICT, and that fluency with these is an essential part of early childhood education. To summarize the views of participants, some salient generalizations can be drawn from the case study data to reflect a broad consensus of ideas and viewpoints. The following comments from the data source highlight some of the consensus views regarding the important role that computers play in the lives of young children:

> *In early childhood education, manipulation and searching of information by children are both important. We need numerous information on online search, as there are lots of resources to be accessed through Internet which*

are helpful to children, and it helps them to have more initiative.

(Principal Interview, Beachside Kindergarten)

Yes, it's important, no matter how adults or kids presently use computers. It's very popular. A primary school even has computer handbooks. Computers have penetrated the kids' world.

(Teacher Interview, Miss Chin, Countryside Kindergarten)

We can access the Internet very often now. Children need to fulfill the need of the society.

(Teacher Interview, Miss Lou, Cityside Kindergarten)

I allow my son to browse websites for fun. He plays with the computer for 45 minutes a day. I think technology plays a significant role in his daily life.

(Parent 3, Beachside Kindergarten)

I believe that information technologies can broaden my daughter's experiences and motivate her to complete the class work at school.

(Parent 6, Cityside Kindergarten)

I agree that children should learn how to use computer at young age and computer software is a good teaching tool for children to learn different skills through activity-based learning.

(Parent 2, Countryside Kindergarten)

ICT as tools for learning and teaching

This study revealed that some learning and teaching practices using ICT in Hong Kong were not only limited to 'play.' ICT also supported their learning as '*meaningful tools'* and essential resources in the 21st century. For example, at Beachside Kindergarten (Chapter 5), children searched for information, collaborated, explored, and extended their findings through different integrated activities throughout the project. This highlights the areas of children's learning as identified by Blatchford and Blatchford (2006), which stressed that children's engagement with ICT should involve communication, collaboration, metacognition, and creativity.

Children were also observed to have engaged in activities that were part of a commercial web-based educational platform. This served to reinforce their learning on various project topics they initially engaged into; educational software enabled them to integrate their thematic learning across the curriculum. Overall, children acquired new information in their own groups with the help of the teacher. Also, in the process, they communicated with others on their present activities. The presence of ICT enabled them to acquire new skills and knowledge, and to participate as citizens of the new millennium. This has been important for parents and principals, as shown in the following statements:

> *I agree that children should learn the technologies as early as possible. First, it allows them to learn more new things, in particular, using the*

Internet. Second, they are not interested in homework from school except those English and Mathematics tasks with computers.

(Parent Interview, Parent 3, Cityside Kindergarten)

This is another mode of learning. Many children have computers and CDs at home. Therefore, we can provide a variety of learning modes for them in school.

(Principal Interview, Countryside Kindergarten)

Regarding the use of computers in teaching, this study found that teachers used computers to assist teaching in various ways. For example, teachers at Beachside Kindergarten frequently used computers and other ICT to enhance their teaching strategies. They produced teaching materials like electronic storybooks using presentation software; they searched for information about projects they were embarking on. ICT helped them prepare their lessons and enabled them to explore projects that they provide to children. Teachers supported children by documenting their learning through digital cameras and digital video. Further, they shared their ideas with peers to reflect on their own learning. They also used the web-educational platform for children to consolidate and extend their learning on themes and projects at both home and school contexts. Additionally, teachers documented and mapped children's progress with ICT in order to share the same with parents. Parents of students from Beachside Kindergarten were encouraged to support their children's learning

through activities on the web-based educational platform. These practices are consistent with two of the seven principles of effective ICT applications that Siraj-Blatchford and Siraj-Blatchford (2005) suggested, namely, (1) to ensure an educational purpose and (2) to encourage collaboration. Moreover, they also used computers for lesson plans, evaluation, and reflections; they felt this approach was more efficient compared to the hand-notes. These aspects has also supported by previous studies (e.g., Clements, Natasha, and Swaminathan, 1993; Yelland, 1999) which indicate that computers are powerful resources for children's learning in new and dynamic ways because of their capacity to enable the representation of ideas in new modalities and the sharing of findings in a variety of modes.

In contrast to Beachside Kindergarten, teachers of Countryside and Cityside Kindergartens did not use computers as frequently or as effectively to assist in their teaching. In general, they simply selected educational software for use in the computer corner or in the computer laboratory, and these served basically as play activities to reinforce traditional learning. However, they did sometimes use computers to search for information when teaching various themes. They seldom documented children's learning using ICT except in cases when children were engaged in projects that required obtaining information from the Internet, or when they need to print out such materials.

In conclusion, it was apparent that all teachers in the case study schools searched for information, prepared lesson plans and worksheets for children, and evaluated their teaching and reflection with the use of computers. The extent to which this was embedded in their daily lives varied, with teachers at Beachside integrating ICT for

teaching and learning more effectively than other sites.

Importance of ICT in teaching and in communicating with other teachers and parents

In relation to teaching with ICT, principals of the kindergartens were all conscious that ICT should be regarded as an important resource for teaching and communication in the 21st century. They agreed that computers can raise the learning interest of children and thus encouraged teachers to use computer to assist in their teaching. For example, one principal stated:

> *I encourage teachers to do so. They make a storybook and present it on Power Point. I like a variety of teaching strategies in order to raise the learning interest of children.*
>
> *(Principal Interview, Countryside Kindergarten)*

Regarding the use of ICT for communication, teachers said that they coordinated with parents through the school webpage and added that they were expected to check their e-mails for school notices. The principals believed that computers made their administrative work more efficient, indicating that they were able to access documents, such as minutes of meetings, lesson plans, teaching evaluations, and worksheets for children, more easily with the new technologies. For example, one principal said:

It's the need of this generation. If she writes the teaching plan by hand, she has to write it again for amendment, it is just wasting a lot of time. Computer is more convenient.

(Principal Interview, Cityside Kindergarten)

Additionally, teachers were also expected to update the information on the school webpage by uploading relevant photos and video clips from school activities so that parents and visitors could see them. Principals indicated that they found the school webpage as a suitable tool to help parents gain better understanding of the educational goals of the school. It also enabled them to share school information much more easily. Furthermore, principals said they also provided additional information for parents, such as effective techniques for raising children, so that they understood each other's role and could act more positively through effective communication. In particular, since most of the parents in Hong Kong are working parents, teachers could seldom communicate with them face to face. Therefore, parents were able to access information on the school and curriculum issues around the development of their children through the webpage. One principal said:

I use e-mail to contact them. We upload school notices and school activities photos, and recommended website links on our school webpage. This year, we added one more section we refer to as "mailbox to raise the kids.' Parents can tell us what difficulties they are facing in teaching kids, and I try to answer them.

(Principal Interview, Cityside Kindergarten)

Siraj-Blatchford and Siraj-Blatchford (2005) emphasized the importance of home-school communication for a better understanding of and more positive attitudes towards the roles of teachers and parents as care-givers of children. Data from this study provided support for the importance of this consideration.

8.2. 2 Teaching Practices of Teachers Using Computers in their Early Childhood Program

Research Question 2 asked:

In what ways do teachers plan for use of computers in their early childhood programs in Hong Kong kindergartens?

From the results of the survey (Chapter 4), it was revealed that most of the head teachers in the kindergartens were responsible for the implementation of computer activities in the curriculum (Fig. 4.7). About 75% of the respondents in the survey indicated that they have placed the computers in dedicated computer rooms (laboratories); only 32% advised that they be placed in computer corners inside classrooms. Accordingly, almost 60% of the teachers use computers only once a week since the computer laboratories were shared by different classes. Only 20% of the teachers indicated that they have used computer activities in the computer corner in their classrooms on a daily basis (Fig. 4.8).

Thus, infrastructure decisions have not facilitated computer activities being appropriately integrated across the curriculum. Rather, their use frequently served as a 'reward' when children completed their regular classroom tasks. Furthermore, results also indicate that the ICT environment present in kindergartens were limited to printers and scanners, and that the use of the Internet was also evident, but in a limited way. Audio and video recorders, digital cameras, video cameras, and MP3 players were not commonly provided for children to experience in kindergartens. Such technologies could have enabled the teachers and children to enrich their work in multimodal formats. Additionally, they could have allowed teachers to document their students' learning. Significantly, most of the computers at computer corners in classrooms were not connected to the Internet. This restricted the teachers' ability to provide experiences for the children, especially when seeking out latest information, interacting with the community, and engaging in activities through the Internet.

Similarly, teachers mainly used educational software that was readily available in the market. On the other hand, they selected structured computer activities based on existing programs on the school webpage provided via the educational platform for children's learning by which they subscribed to (Fig. 4.2). Most of these computer activities were found to be primarily of drill and practice type, and did not emphasize thinking and problem-solving, as well as deterred children from sharing their learning by collaborating, problem-solving, and communicating with each other.

In this way, data from the survey and observations revealed that the practices in Hong

Kong were at odds with the position statement developed by NAEYC (2009), which asserted that early childhood teachers were responsible for maximizing the benefits of technology to children with the thoughtful use of computers and other technologies in classrooms. This was to be achieved by expanding the range of tools available for children in order to search for information, to provide contexts in which they were able to solve problems, and extend their understanding of concepts at their own pace. Also, the statement recommended to early childhood educators that they should provide enough equipment to engage children in technology-based activities in a sustained manner, as well as document children's learning using such technologies (p. 174 and p. 316). In Hong Kong, the limited range of technologies available did not allow for this.

Case study data revealed that before 2006, there was no specific curriculum guideline or policy framework from the Hong Kong Government that served as guidelines for parents and schools to incorporate ICT into early childhood programs. Principals were concerned that the development of fine motor skills of young children would be compromised if they provided too many computer activities in their schools. They all emphasized that young children in K1 class (3 years of age) should not use computers for this reason. From the interviews, they shared that they felt that the appropriate age for implementing computer activities was in K2 (4 years of age). As one principal stipulated:

> *We don't expect K1 students to learn with computers once they start their schooling, and teachers won't allow this either. Fine motor skills have not yet been developed well, for example, when operating the mouse. If they*

are ready, it would be the teacher who would decide when the children can play with the computers.

(Principal Interview, Countryside Kindergarten)

Principals were in charge of the purchase of educational software or the implementation of web-based educational platform which constituted the computer activities in their centres. Although the principals advised that they tried to purchase good quality educational software and integrate it with other aspects of the curriculum, they were limited in ways to do this since much of the 'good' software were in English and they needed software in Chinese language. Therefore, teachers produced some of their own games and activities using slide presentations (e.g., Power Point). They said that they did this because they wanted to integrate ICT into their project learning approach. Observed ICT environments were similar to the scenarios described in the results of the survey. If there were peripheral equipment, they were mainly scanners, printers and the Internet. However, use was often limited as shown in the next quote from a principal, who said:

There are eight computers in the computer laboratory. Although they are connected to the Internet, there is only one of them is mainly for teachers to update website information. It is mainly for administrative use and is not related to teaching.

(Principal Interview, Countryside Kindergarten)

Beachside Kindergarten designed their own computer activities on the web-based

educational platform in consultation with staff from the computer company. They did this so that they could integrate their use with their theme or project learning. In addition, teachers helped children in their quest for new information through the Internet. They also attempt to extend children's learning with the use of recording equipment, such as digital camera, video cameras, and scanners. These equipment are similarly used to document children's learning. The teaching practice stimulated a 'need-to-know' strategy that activated children's interests (O'Rourke, 2003). The classrooms of Beachside Kindergarten were set up with projectors and screens for group time activities (see Appendix 5a). This allowed teachers to produce electronic story books and to engage in shared learning with children.

8.2.3 Integration of Computers into the Curriculum of Hong Kong Kindergartens

Research Question 3 was:

How is the use of computer integrated into the curriculum in early childhood kindergarten in Hong Kong?

It has already been noted in the previous section that the location of the computer hardware, as well as the availability of peripherals and the lack of appropriate software, have been the major factors that inhibited the integration of computers across the curriculum in Hong Kong kindergartens.

It was noticed that the physical spaces available also affected the use and location of

computers. Floor plans of classrooms based on the three case study centres showed that Beachside and Countryside Kindergartens placed the computers in computer corners in their classrooms (see Appendices 5a and 5b); in contrast, Cityside Kindergarten placed theirs in computer laboratories. There were two computers placed at the computer corners in the classrooms of both Beachside and Countryside Kindergartens. Children were encouraged to play with the computers installed with educational software or platform activities in pairs, or individually, by placing more than one chair at the corners. They were available for children during their free-time play after they have completed their classroom tasks (see Chapter 5, section 5.5., Chapter 6, section 6.5.).

Computers at the computer corners of Beachside Kindergarten were also used for group time, aided by the projector and screen in the classroom (see Chapter 5, section 5.5.2., scenario 1.). Teachers of Beachside Kindergarten encouraged children to seek information through the Internet in small groups in the computer laboratories and facilitated children's thinking through discussions (see Chapter 5, section 5.5.4., scenario 1.). These observations revealed that teachers of Beachside Kindergarten maximized the learning of children with the use of computers, both in the computer corners and in computer laboratories. Teachers of Countryside Kindergarten did not fully integrate their use into the curriculum despite having computer corners. Children were provided with some computer games for 'fun' (see Chapter 6, section 6.5.4., scenario 2.) and occasionally, they were allowed to print out their works as the works were saved for them. Thus, although computers were placed at the computer corners in the classrooms, the computers were not commonly used by teachers or children as an

integral part of the kindergarten program.

In contrast, at Cityside Kindergarten, all computers were located in the computer room/ laboratory. Children were observed as they played with programmed activities that were mainly academic and skills-based (for examples, see Chapter 7, section 7.5.1., scenario 1; and section 7.5.2, scenario 1.). Children completed programmed activities by themselves with headphones on. It was observed that there were limited interactions and only infrequent collaborations between children. Rarely did the children discuss their work nor did the teacher support their learning process.

In contrast, children of Beachside Kindergarten played with computer activities using the web-based educational platform to foster their learning about the themes (see Chapter 5, section 5.5.1., scenario 2.). They were encouraged to search information through the Internet in order to explore their projects, and they often shared ideas and talked to each other.

8.2.4 The Kinds of Learning with Computers and Non-computer Activities in Hong Kong Kindergartens.

The final research question was:

What kinds of learning are evident in the computer and in the non-computer activities in

Hong Kong kindergartens?

All children observed in the three kindergartens revealed that they were more interested in different activities using ICT when they could choose what they were doing and were able to do them without assistance. In particular, they were observed to have been highly motivated while playing computer games during their free play time after they finished their regular class work or homework. This was also noticeable from among parents and teachers who reflected:

> *He has a different behavior. He will relatively take the initiative in computer games. After I turn on the computer, he sits down very fast. However, no matter how I intently ask him to study and do his homework, he refuses to listen. After I hint that I will turn off the computer, he will obey my command to study and do homework.*
>
> *(Parent Interview, Parent2, Cityside Kindergarten)*

> *I think children are more interested in learning through computers. Compared to other methods, for example, nursery rhymes, story-telling, or using puppets in teaching, I think they are more interested in learning with computers.*
>
> *(Miss Yen, Beachside Kindergarten)*

Some of the children stressed that they loved going to school just because they wanted to play computer games (see examples on Chapter 5, section 5.4.3., Chapter 6, section

6.4.4.; and Chapter 7, section 7.4.1.). They claim that computer games were enjoyable and fun. In general, the observations showed that they behaved positively when they played with computers in the computer corners and collaborated appropriately with peers in computer laboratories.

The literature has stressed that children should be allowed to direct their own play activities since they are more likely to feel successful when they have defined them for themselves. Learning should not be bound by adult-established concepts of completion, achievement, and failure (Bredekamp, 1987, p.3). Herein, while the computer activities provided by two of the three kindergartens were mainly very structured in type and did not provide contexts for the children to control the course of the game, they still enjoyed playing with them and sought them out as an activity to complete when they had a choice of what to do. As such, the activities have taught them something specific (e.g., adding up) through structured activities, even though there was little or no emphasis on thinking and problem-solving.

Where there were ample computers in class computer corners and the laboratory, the children were encouraged to maximize learning by working in small groups, and where similarly asked to interact with community members as they explored their project under the teacher's supervision. In this way, their learning was collaborative and meaningful to them as they had some control over and were interested in it.

In this study, the observed experiences of computer activities for children were found to be prescriptive. They were mainly teacher-selected and only occasional instances were

observed when children were allowed to direct their learning at their own pace. Although children were allowed to play with computer games in computer corners during free-time play, the educational software available at the computer corners were selected by the teachers, or children were accompanied by the teachers in computer laboratories during small group activities. One principal said:

> *Children play with the computers at the computer corner in the classroom most of the time. The computer corner is designed for children's play. If limited to a computer laboratory, there is less chance for them to leave the classroom to play with computers there. Teachers may bring a group of children out to search for information from Internet at the computer laboratory sometimes, but it is not very often. Children play with the computers inside classrooms.*
>
> *(Principal interview, Countryside Kindergarten)*

In this study, children were able to use different ICT for specific learning related to content planned in the program designed by their teachers. This incorporated the use of educational software and examples of web-based education platform activities, digital cameras, and use of the Internet in different ICT activities (see Chapter 5 for Scenario 2, 3 of Day 1; Scenario 1 of Day 2 and Day 3; Scenario 1 of Day 1). Their learning through non-ICT activities were integrated more effectively than those using ICT. The observations showed that it was the schools' strategy to use computer activities to primarily foster children's academic learning rather than maximize them as 'meaningful learning' tools for children to integrate into their learning as a whole.

Social learning

The learning experiences of children at Country and Cityside Kindergartens revealed that they worked with structured activities mainly individually at set tasks in computer corners or in computer laboratories. They were not encouraged to understand the ways in which ICT changed their learning. Computer activities served as a 'play' activity for fun or 'revision' for a stated academic purpose. On the other hand, the learning experiences of children at Beachside Kindergarten were different as they were observed working with peers. They explored and sought out information on the Internet and were able to find out about their community through Internet searches and by talking to members of their community. Children were capable of using a variety of ICT equipment independently and they solved problems with peers. For instance, children were observed collaborating with peers as they shared the computers in computer corners; they not only contributed important information, but also supported each other with clues attained from difficult contexts in games or activities.

An analysis of children's drawings on their understandings of computers has exposed their broader views on the role of computers in their lives, which included information- and communication-rich environment created through the Internet. They understood that they were connected with e-mails and webcams to a world beyond their own. In their drawings, they drew in detail the application 'Internet Explorer' (via the icon) and included the computer screen and the image of a webcam to reveal that they not only knew that they existed, but they could similarly articulate for which the 'icon' was used

for (see Appendix 8.c.). Furthermore, their drawings also exposed that computers are a common part of their daily lives. They noted how their family used them and elaborated on their operational skills with computers, which they informed had come from siblings or parents.

8.3. Limitation of the study

The findings and results of the study were inspiring as they exposed the phenomenon of how children use ICT for their learning at kindergarten schools in Hong Kong. However, although the scope of this study was broad and the data from the survey was obtained from a majority of kindergartens in Hong Kong, the survey was not distributed to childcare centers, which also play an important part of early childhood services in Hong Kong. In addition, the case studies included only kindergartens setting in Hong Kong wherein children attended only half-day sessions; children who attended whole day sessions or who attended in a childcare setting were not included in this study.

The age group of children under study was between 5 and 6 years of age. The younger children in K 1 and K2 (3 and 4 years of age) were not included. Further research might provide a more holistic picture in the early childhood sectors of Hong Kong.

8.4. Summary

The findings of the surveys, interviews, and the documentation of the three case studies reveal that the beliefs of the principals, teachers, and parents on the role of ICT in early childhood education in Hong Kong are important considerations for the use and impact of ICT on the teaching and learning of young children. Even though the information derived from the study confirmed their views about the importance of using ICT in early childhood education, the observed teaching practices of the teachers and the learning experiences of young children were in general limited and constrained by rigid software that were inflexible for use. There were some examples of the innovative use of ICT but, in general, it was apparent that these uses fared below those from previous studies, which encouraged teachers to view ICT as a meaningful resource for teaching and learning with young children. Parents having computer access for kindergarten use is often an important consideration, but parents should not just consider enrolling their children at a kindergarten with a computer(s) without understanding how the school provides such experiences to their children (Leung, 2003) and how it might be used to support various investigations. The responses of parents in this study indicate that most were not sure about the rationale for using computers during kindergarten years, indicating that there was little consensus between schools and parents on the effective use of ICT with young children.

The Curriculum Guidelines of Preprimary Education from the Education Development Bureau (2006) advocated the integration of ICT into the early childhood curriculum.

Prior to this, there were no clear curriculum guidelines for kindergartens regarding the use of ICT as an effective way to maximize children's learning. The findings from the current study have revealed that children were primarily provided with 'prescriptive' and narrowly focused technological experiences. Children were infrequently observed to be in control of their learning, and most of them were not provided sufficient ICT equipment, which would have helped them document their own learning.

Moreover, ICT resources in kindergarten schools were also comparatively limited. There were limited virtual and audio equipment for children even if there was a great deal of time and opportunity to engage and interact with them in the curriculum. Thus, the full potential of ICT placed in a meaningful context and for real purposes was not generally achieved.

8.5. Implications

The findings of this study revealed that the teaching and learning with ICT for children in Hong Kong kindergartens varied across specific aspects of ICT environment, role of ICT in early childhood education, teaching practices using ICT, and its integration across the curriculum. They are discussed in the following sections.

8.5.1. ICT Environment in Hong Kong Kindergartens

The implications for creating conducive ICT environments for the effective integration of new technologies into early childhood curriculum are that the computers should be placed in the classroom and not in computer laboratories where the children will have limited opportunities to play and explore with the computers when they want to (Davis & Shade, 1999). Provision of a computer corner in the kindergarten classroom was seen to encourage more collaboration between children, which is important for their social learning. Computers should be connected to the Internet to encourage children to interact with the community, as well as to acquire new information for project-based work. With the fast changing pace of new technology, schools should supply teachers and children with a variety of ICT resources that are consistent with those available to them for their daily lives. It is only with a seamless and regular use of new technology that children will become adept with them and in using them appropriately.

8.5.2. Role of ICT in Early Childhood Education

This study also has implications for the role of ICT in early childhood education. It is suggested by this study that ICT can be used as a relevant resource for both teaching and learning. New technologies should support and empower children's learning by providing them opportunities for exploring and experiencing the world in multimodal ways to aid their meaning-making and forge new understandings. They should also

afford contexts in which children can document their own learning using various ICT.

Clear guidelines from the government are helpful for school administrators, teachers, and parents to enable them to understand how to incorporate ICT in early childhood education in both school and home contexts. Additionally, in this study, it has been noted that the school web pages enhanced communication between schools, teachers, and parents. This is also supported by literature that reveals that the involvement of parents and free-flowing home-school communication lead to better understandings and more positive attitudes for teachers and parents about each other's role (Blatchford & Blatchford, 2005).

8.5.3. Teaching Practices Using ICT

The teachers in the study expressed the view that they had not received any formal training regarding the educational use of computers and that, as a consequence, were not confident in using computers to assist and their teaching strategies. They also felt that they had limited professional knowledge about integrating ICT across the early childhood curriculum. Thus, teachers should be provided with on-going and formal staff support systems from schools and government to develop their confidence and equip them with their use of ICT in an effective manner.

The quality of educational software purchased from commercial companies or computer activities included in educational platforms were found to be very structured and not

conducive to encouraging children's creativity, thinking, and problem-solving. Educational software of a high standard and good quality should be carefully chosen to attain its maximum educational value. More importantly, teachers should ensure the use of educational software that encourages children to be in control of their learning, allowing them to play active roles in the process. In particular, more open-structured activities should be provided for children so that they can direct their own learning in order to follow their interests at their own pace.

8.5.4. Integration of ICT across the Early Childhood Curriculum

The Curriculum Guideline of Preprimary Education (2006) was the first attempt for preprimary sectors to incorporate ICT across the curriculum. It advocated that children in the technological world have an urgent need to understand and be engaged in experiencing various ICT that match their daily lives. Thus, it is significant that children be provided with opportunities to understand the value and benefit of these ICT in their daily lives. School administrators and teachers should make use of this guideline to nurture their children to become potent citizens in the technological world.

8.6 Directions for Future Research

Future research with young children and the use of ICT in Hong Kong is quite exciting

and promising. This study could be replicated with a broader cohort (K 1, 2, 3) and thus have its scope extended. Additionally, a comparison of children's learning among the various contexts for kindergartens in Hong Kong could be included. This would mean surveying and studying childcare centres using ICT. Furthermore, future studies could explore the interface between home and school contexts with the use of ICT. This would enable teachers to build on home experiences in effective ways in the kindergarten context and involve parents in the curriculum development process. There is much work to be done to gain empirical evidence from Asian educational settings since there is great variety in the region's educational contexts. Literature on the use of ICT in early childhood education would benefit from cross-cultural studies, which could compare the teaching and learning with ICT in schools across the region.

The use of ICT has changed our lives and how we experience the world. Ongoing projects and data collections such as this will ensure that we are providing educational opportunities for young children that are meaningful and relevant to their lives and experiences.

Appendix 1

Kindergarten Questionaire

Appendix 2

Letter and Consent Forms

(a) Overview of Research

(b) Principals

(c) Teachers

(d) Parents

Appendix 3

Interview Questions

(a) Principals

(b) Teachers

(c) Parents

(d) Children

Appendix 4

Form for Making Observations of Field Notes

Appendix 5

Floor Plan of Classrooms

(a) Beachside Kindergarten

(b) Countryside Kindergarten

(c) Cityside Kindergarten

Appendix 6

Children's Drawings and Explanations-Beachside Kindergarten

(a) Group 1

(b) Group 2

(c) Group 3

(d) Group 4

(e) Group 5

Appendix 7

Children's Drawings and Explanations-Country Kindergarten

(a) Group 1

(b) Group 2

(c) Group 3

(d) Group 4

Appendix 8

Children's Drawings and Explanations-City Kindergarten

(a) Group 1

(b) Group 2

(c) Group 3

Appendix 1: Kindergarten Questionnaire

Survey

Project Title: An Investigation of Computer Environment of Young Children in Kindergartens in Hong Kong

(Please check the appropriate boxes which match your answer/s best)

A. Background Information

1. What types of kindergartens do your school belong to?
   Private □ Non-Profit Making □

2. Which region is your school located?
   Hong Kong Island □ Kowloon □ New Territories □

3. How many children in your school?
   <50 □ <100 □ <150 □ <200 □ <250 □ >250 □

4. How many teachers in your school?
   <5 □ <10 □ <15 □ <20 □

5. Do you have computer activity in school now? Yes. □ (Please go to Q.7)
   No. □

6. Thank you for your participation!

7. Which age groups of children in your school have computer activities?
   3-4 years old. □ 4-5 years old □ 5-6 years old □

8. How many years does your school have computer activities with children?
   <3 years □ <6 years □ <9 years □ <12 years □

9. Who is responsible for the computer activity implementation? (Please circle as appropriate)

   Head teacher □ Teacher assistance □ School office staff □
   Computer company □

10. What is the percentage of teachers in your school use computer in teaching?

    10%-20% □ 21%-40% □ 41%-60% □ 61%-80% □ 81%-100% □

11. How often do they use computer in teaching?

Daily □ weekly □ monthly □ Others_____

12. Does the school provide staff development on computer training?
Yes □ No □

If yes, please state what types of computer training_____

B. Computer learning environment

1. Where are the computers located?
School office □ Computer laboratory/centre □Computer corner in classroom □

2. How many computers in the computer laboratory/centre?
<5 □ <10 □ <15 □

3. What kind of computers that are installed in computer laboratory/centre?
Personal computer □ Macintosh □ Laptop □ Others □_____

4. What kind of hardware is using in the computer laboratory/centre?
486. □ Pentinum □ Pentinum II □ Pentinum III □ Pentinum IV □
Others_____

5. What are the sources of software in the computer laboratory/centre used by children?
Designed by Computer company □ Commercial package □
Designed by teachers □

6. What kind of software is installed at the computer laboratory/corner for children?
Window □(Version_____) Linux □(Version_____)
Doc □ (Version_____) Others□(Version_____)

7. What are the equipments in the computer laboratory/centre for children use?
Printer □ Scanner □ Internet □ Digital camera □ Digital video □
Webcamera □ Others _____

8. Are there other types of computer input/output devices for children?

Joystick □ Touch screen □ alternative keyboard (e.g.intellikeys) □
Switches □

9. Are the chairs in the computer laboratory/centre adjustable to children's physical needs?
Yes □ No□

10. Does the mouse of the computer in computer laboratory/centre fit children's physical needs?

Yes □ No□

11. How often do children use the computer laboratory/centre?
Everyday □ twice a week □ once a week □ Others_____

12. How long for each session of computer activity?

0-15mins □ 16-25mins □ 26-35mins □ 36-45mins □ >46mins□

13. How do children work at one computer in the computer laboratory/corner?

Individually □ In pair □ small group (3-8 children) □
Whole group □

14. Do children play with the computer during free choice time in classroom?

Yes □ No□

15. Are the computer activity related to children's learning in class activities?

Yes□ No □

16. Is there any computer curriculum guideline in your school?

Yes □ No □

If yes, what is the source of the guideline?_____

17. What kind of computer activities do you provide to children?

Commercial package software □ School webpage □ Teacher's production□

18. Do children have their portfolio to keep their work of computer activities?

Yes □ No □

19.Are their portfolios one kind of assessment tools for children's learning?

Yes □ No □

~ End~

Thank you for your attention and cooperation!

Appendix 2.a: Overview of Research

XX 校長
XX 幼稚園

XX 校長:

本人爲澳洲墨爾本科技大學(RMIT University)幼兒教育學部之博士研究生。本人的博士研究標題爲『香港學前兒童運用資訊科技建構學習之個案研究』。二十一世紀的兒童，正處於一創新的學習環境下進行學習 (Craig, 2000)。有關學前兒童在課室運用資訊科技建構學習及幼教老師如何在課程上綜合資訊科技以輔助學前兒童進行學習，已成爲一重要的議題。現誠邀 閣下參與研究之問卷調查，閣下將不會被識別，且可以在計劃進行期間任何時間退出計劃而不需要任何解釋。

現附上參與計劃之同意書及調查問卷，如閣下願意參與，敬請於十月二十七日前填妥同意書及有關問卷，**分別**用隨本卷附上之回郵信封寄回新界露屏路十號香港教育學院幼兒教育學院。若閣下對此計劃有任何查詢，可隨時聯絡本人 29487565(教院)或 6138 0084(手提電話)，如有需要，亦可聯絡本人之博士研究指導教授，Professor Nicola Yelland (613) 922 57867。

幼兒教育學院

梁衛文講師謹啓

二零零二年十月十五日

Appendix 2.b: Consent Form-Principals

親愛的校長:

本人是澳洲 RMIT 大學的博士研究生。本人的研究計劃題目是『香港學前兒童利用電腦輔助學習之個案研究』。二十一世紀的兒童，正處於一創新的學習環境下進行學習 (Craig, 2000)，有關他們在課室運用資訊科技及幼教老師如何有效綜合資訊科技於課程上，以輔助兒童進行學習，已成爲一重要及具爭議性的議題。幼兒教育老師們是處在一個需要作出有關使用科技於幼兒教導和學習的重要決定的位置。 閣下被邀請參與這計劃並出席計劃之訪問。所得數據將不會公開及會保存在安全的位置。閣下將不會被識別，及閣下可以在任何時間退出這計劃而不需要任何解釋。

若閣下有位何有關此計劃的疑問、可以聯絡本人 2948 7565(公司)和 6138 0084(手提電話)，或閣下可以在任何有需要的時候聯絡本人的監督人，Nicola Yalland 教授 (613) 922 57867。

幼兒教育學院

梁衛文講師謹啓

二零零二年十月十五日

參與者同意書

我_____ 願意參與此計劃並於訪問時進行錄音或錄影。

姓名:_____ 日期:_____
(參與者簽名)

學校:_____

Appendix 2.c: Consent Form-Teachers

親愛的老師:

本人是澳洲 RMIT 大學的博士研究生。本人的研究計劃題目是『香港學前兒童利用電腦輔助學習之個案研究』。二十一世紀的兒童，正處於一創新的學習環境下進行學習 (Craig, 2000)，有關他們在課室運用資訊科技及幼教老師如何有效綜合資訊科技於課程上，以輔助兒童進行學習，已成爲一重要及具爭議性的議題。幼兒教育老師們是處在一個需要作出有關使用科技於幼兒教導和學習的重要決定的位置。 閣下被邀請參與這計劃並出席計劃之訪問及教學活動觀課及進行視像錄影或錄音作研究分析。所得數據將不會公開及會保存在安全的位置，閣下將不會被識別及閣下可以在任何時間退出這計劃而不需要任何解釋。

若閣下有位何有關此計劃的疑問、可以聯絡本人 2948 7565(公司)和 6138 0084(手提電話)，或閣下可以在任何有需要的時候聯絡本人的監督人，Nicola Yalland 教授 (613) 922 57867。

幼兒教育學院

梁衛文講師謹啓

二零零二年十月十五日

參與者同意書

我_____ 願意參與此計劃並於訪問及教學時進行錄音或錄影。

姓名:_____ 日期:_____

(參與者簽名)

學校:_____

Appendix2.d: Consent Form-Parents

親愛的家長：

本人梁衛文爲澳洲皇家墨爾本科技大學 (RMIT University) 幼兒教育系博士研究生。本人的博士研究題目爲「香港學前兒童應用資訊科技建構學習之個案研究」。廿一世紀的兒童，正處於一創新的環境下進行學習 (Craig, 2000)，有關在學前兒童課室運用資訊科技建構學習及幼教老師如何在課程上綜合資訊科技以輔助學前兒童進行學習，已成爲一重要的議題，所以，幼兒教師正處於一個作出重要決定的位置上。本人誠邀閣下及貴子弟參予這項研究，閣下將被邀請在出席一次一小時之錄影訪問，而貴子弟將被錄影在課室內進行學習之情況（每星期二小時，共五星期）。 閣下及貴子弟之身份將不會被識別，而這些資料只作研究用途並保密存妥，且閣下可在任何時間退出這計劃而不需要任何解釋。

如對此研究有任何疑問，請致電 2948 7565 (辦公室) 及 6138 0084 (手提) 與本人聯絡，或致電 (613) 992 57867 與本人的指導教授，Professor Nicola Yelland 聯絡。

敬祝

教安！

研究生

梁衛文

廿零零三年十月廿七日

參與者同意書

我_____ 願意參與此計劃並進行訪問。

本人並同意敝子弟_____參與上述研究計劃。
姓名:_____
(參與者簽名)

學校名稱: _____
姓名: _____ 日期:_____

Appendix 3.a: Interview Questions for Principals

1. Why do you provide computer activities to children at your kindergarten?
2. How long have you provided computer activities for children?
3. Do you agree that kindergarten children should learn with computers at this time? Why?
4. Are there any guidelines/curriculum document for teachers to support their planning with computer activities?
5. Who is in-charge of the planning of computer activities?
6. To what extend do you think that the computer activities are integrated to other activities in class?
7. How do you evaluate the computer activities in your kindergarten?
8. Where do you purchase the software?
9. What do you think about the quality of the software you have?
10. Are the teachers involved in purchasing the hardware and software? In what ways?
11. Do your teachers use the computer to teach? How often?
12. Do you provide staff training for teachers to use computers in their teaching?
13. Do you encourage teachers to use computers for teaching and learning? Why?
14. Do you believe computer skills are important for teachers to have? Why?
15. Do you use a computer in your office? What for? How often?
16. What types of software do you use?
17. Do you use computer at home? What for? How often?
18. How long do you use computer for work?

Appendix 3.b: Interview Questions for Teachers

1. Do you agree that children should play with computers in your kindergarten? Why?
2. How long have you provided computer activities for your children?
3. Do your children play with computer in the computer corner or center?
4. How do you set up the computer corner or center?
5. How do the children use the equipment in the computer corner or center?
6. How do you plan the computer activities in your class?
7. Are you in-charge of the planning of computer activities of your class?
8. Do you have any guideline for planning the computer activities?
9. Are you in-charge of the implementation of computer activites?
10. How often do your children play with computers?
11. What kind of software do you provide to your children in class?
12. Where do you purchase this software in class?
13. How do you evaluate the computer activities?
14. Do you keep a portfolio of children's work with computer activities?
15. Do you observe your children behave differently when using a computer ? If so, how?
16. Do you use computer to teach in class? Why?
17. How long have you been using compute to teach?
18. How do you evaluate your teaching using computers?
19. Do you believe that teacher should use a computer for teaching? Why?
20. Where did you learn your computer skills?
21. Do you use computer after class or at home?
22. What kind of software you always use?

Appendix 3.c: Interview Questions of Parents

1. Do you agree that children should play with computers in their kindergartens in this century? Why?

_____

2. What do you think the rationales behind the kindergartens provide computer activities to the children?

_____

3. Do you think that children can learn from the computer? Why?

_____

4. What do children learn from the computer?

_____

5. Do you have a computer at home?

_____

6. How often do you work with computer at home and what for?

_____

7. How long do you work with computer?

_____

8. What kind of software do your computer is using at home?

_____

9. Where do you buy this software?

_____

10. Do your home computer install with internet?

_____

11. How often do you use the internet at home/work?

_____

12. Do you allow your children to play with computer at home? Why?

_____

13. Do you limit the time for your children to play with computer at home? Why?

_____

14. What kind of software do your children play with the computer at home?

_____

15. Do you play the computer with your children at home?

_____

16. Do your children play the computer with other siblings at home? Why?

_____

17. Do you observe if your children behave differently while they play with computer?

_____

18. How?

_____

Appendix 3.d: Interview Questions of Children

1. Do you like to go to school? Why?

_____

2. What do you learn at school?

_____

3. What kind of activities in class you like most? Why?

_____

4. Are there any activities you don't like? Why?

_____

5. Do you like computer activities in class?

_____

6. What do you play with the computer activities?

_____

7. What kind of computer activities you like most?

_____

8. Are there any computer activities you don't like?

_____

9. Do you like to play computer activities with friends?

_____

10. Do you think computers help you to learn? How?

_____

11. Do you have computer at home?

_____

12. How often do you play with computer at home?

_____

13. Do you use the computer at home by yourself or with friends and/or family?

_____

14. Who showed you to play with computer?

_____

15. Can you draw a computer for me that shows all the different parts and tell me how they work?

_____

Appendix 4: Form for Making Observations of Field notes

Observation School (觀察學校)

School (學校):_____

Date (日期): _____Time(時間):_____

Class(班別): _____No. of children(學生人數): _____

Location(地點): _____

Lesson (Synopsis)(課堂概要)

- Overview(概觀) /Software used(軟件使用)

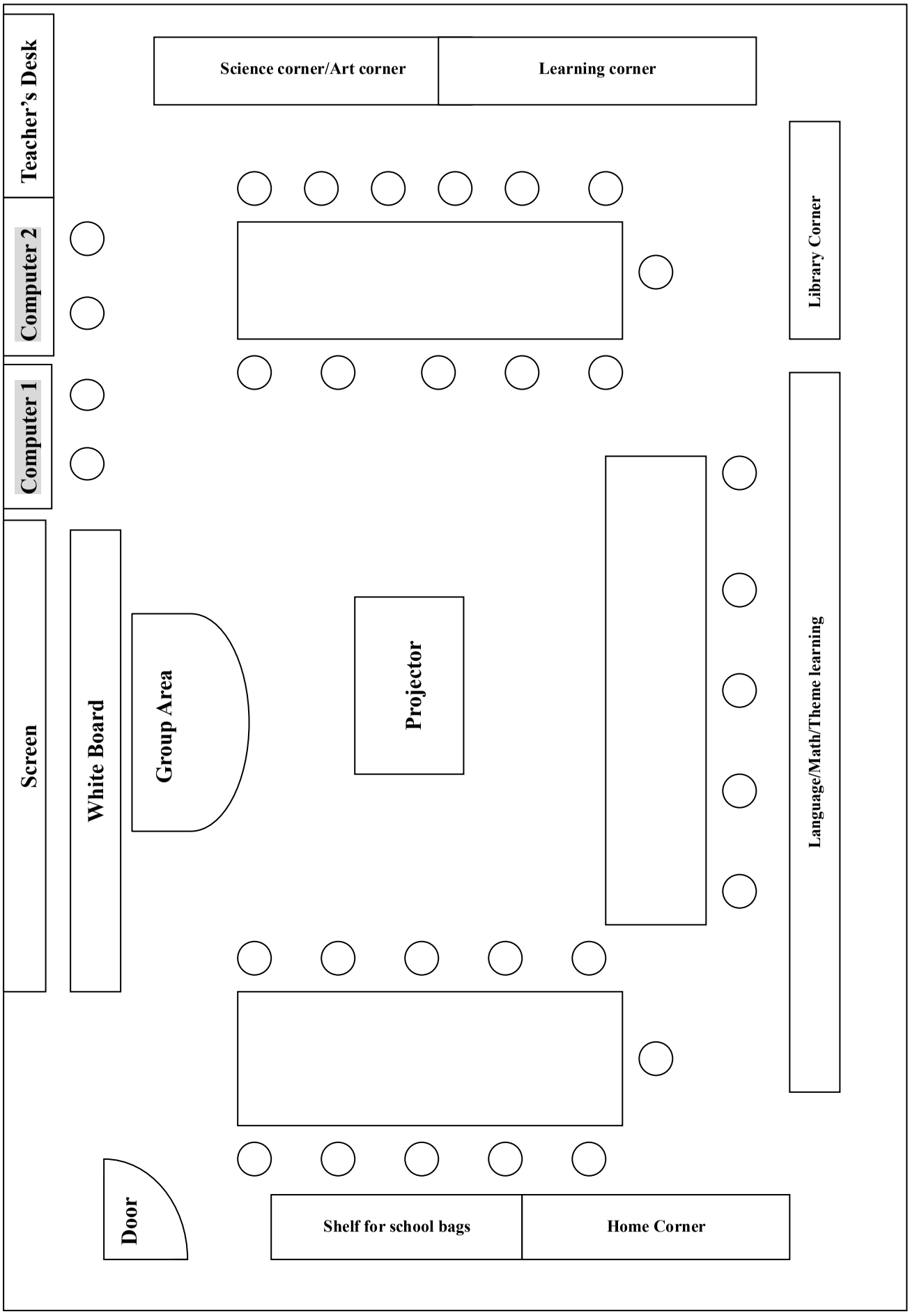
- Observations(觀察)
  Social(社交)

- Cognitive(認知)

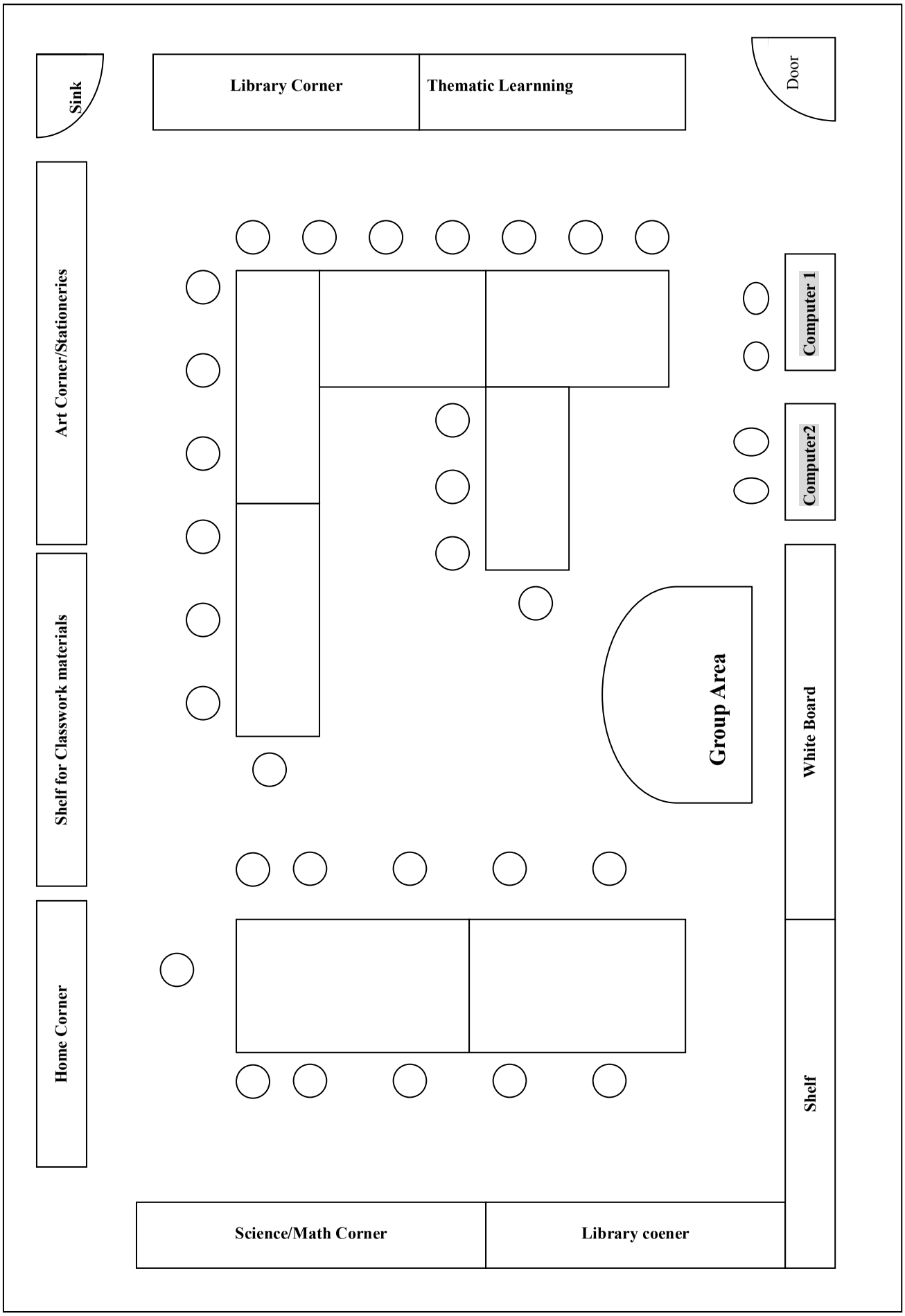
- Collaborations(合作)

- Teacher role(教師角色)

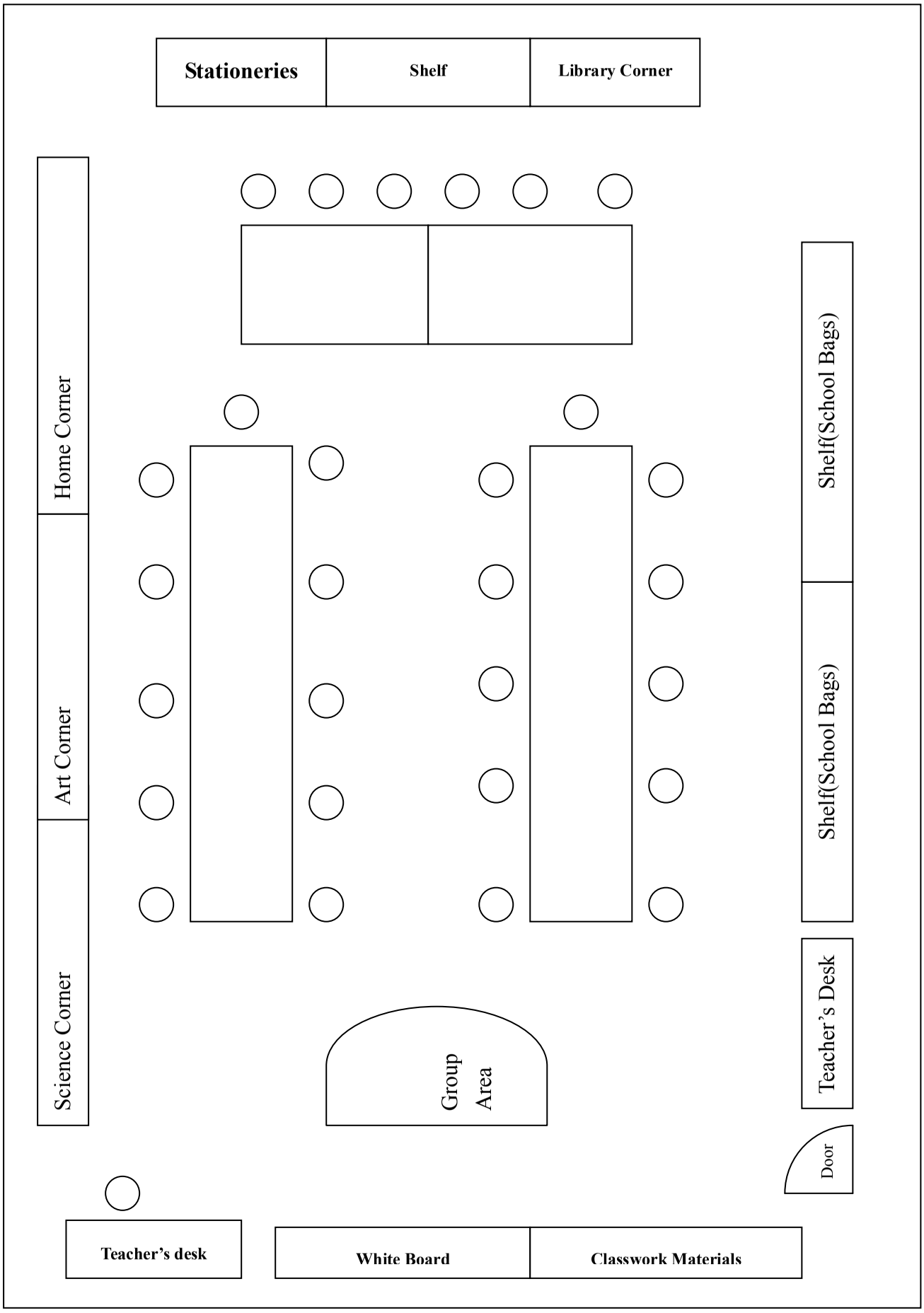
Appendix 5.a.: Floor Plan of Classroom-Beachside Kindergarten



Appendix 5.b.: Floor Plan of Classroom-Countryside Kindergarten



Appendix 5.c.: Floor Plan of Classroom -Citryside Kindergarten



Appendix 6.a.: Children's Drawing and Explanations – Group 1

Children's drawing	Explanation
	The child drew a keyboard with some buttons without either numbers or letters at the bottom of the picture and a mouse linked from the right bottom corner of the computer. He said that the orange box next to the mouse was the hard disk which was used to switch on the computer. The child also drew some images on the screen.
	The child explained that the picture was drawn by 'Paint Brush'. She said that the rectangular sides were the frame of the computer, and that a stand was used to support the computer. She also drew a rainbow because she just liked it.
	The child explained the rectangular box was the keyboard of the computer which was for typing but there was not any numbers or letters on the buttons of the keyboard. A mouse was drawn linked with the keyboard and she said that games could be played by clicking it twice. The square with three flowers was the screen of the computer.
	The child drew two speakers on the sides of the computer and explained that they were used for listening to the music. A mouse was drawn next to the keyboard and two numbers, 6 and 7 were drawn to represent the row of numbers on top of the keyboard.

	This child said that the blue rectangle on the right corner was the hard disk for switching on the computer. She drew a keyboard with some buttons with no numbers and letters below the computer stand. She explained that there were two images drawn inside the screen.

Appendix 6.b: Children's Drawing and Explanations – Group 2

Children's drawing	Explanation
	The child drew some buttons with numbers from 1-0 on the top of the keyboard. He explained that the numbers were for calculation though he could not name the keyboard. There were some buttons on the keyboard without either numbers or letters. He also drew the '+' and "-"at the bottom of the computer screen and he said they were for adjusting the volume of computer. There were two speakers on top of the computer and he named them correctly. He drew a mouse near the keyboard but he mentioned it.
	The child wrote two Chinese characters on top of the computer and said that it was the brand of the computer. She explained that the images were drawn on the screen of the computer. She also drew a keyboard but she could not name it. There was one speaker on the side of the computer and a mouse linked to it though she did not explain them.
	The child explained that the image was drawn on the screen of the computer. He drew two speakers which were placed on each side of the computer and a mouse was linked from the corner of the computer. He did not explain what the rectangular object was and could only name the screen.

	The child drew two speakers on the sides of the computer. She explained that right one with a black button was for adjusting the volume and the one on the left was for listening. She drew a keyboard with letters from A to N in ascending order on the buttons but s/he could not name it. She also drew a mouse linked from the corner of the computer and it was for clicking something but she named it correctly. She then drew a printer at the bottom of the computer desk but she thought it was a printer. There were two drawers below the printer and she said her dad used them to store something. On the shelf of the computer desk, she drew some printing paper and a book.
	The child drew some buttons with letters from A to P in ascending order on the keyboard. He explained that the button were for pressing and could not name the keyboard.
	The child drew a frame in purple and explained that it was a screen of the computer. There was a cross on the right top corner of the screen though she did not explain it. She named the red box next to the computer was a speaker but the other red box was a timer which used to count the time for each turn of the player. She also drew a keyboard with numbers from 1 to 7 on the buttons but could not name the keyboard. A hard disk was also found on h/his picture but the child did not either explain or name

	it. She drew and named a mouse linked from the corner of the computer.

Appendix 6.c.: Children's Drawing and Explanations – Group 3

Children's drawing	Explanation
	The child explained and named that s/he drew two speakers on the side of the computer and a mouse. He also drew a keyboard in black without buttons and did not name it.
	The child drew a 'X' on the right top corner of the screen and explained that the window is closed when click the cross. She said that the images on the screen were the theme of the computer. There was a keyboard under the computer and she said it was for typing. A rectangular box in red represented a timer and when all the sand falls means it is the other child's turn. Though there was a mouse linked from the computer but she did not explain and name it.
	The child said that he drew a speaker and a light bulb on the top of the computer but he did not explain why he drew the light bulb though the other child said it was used when typing in the dark. However, he drew two  shapes represented loading something.

	The child drew a keyboard below the computer and could not name it. She only pointed at the keyboard in the computer room and said,' they are same'. There were some checkers on the keyboard represented the buttons. She said that the buttons were used to switch off the computer. She drew a speaker on the side of the computer and named it. She also drew a printer on top of the picture and explained that it was for printing pictures. A mouse was linked from the corner of the computer and she named it correctly.
	The child drew two speakers on the sides of the computer and named them correctly. He also drew a keyboard with colorful buttons without numbers and letters. He said that the printer can print out the picture though he did not drew a printer in the picture.

Appendix 6.d: Children's Drawing and Explanation – Group 4

Children's drawing	Explanation
	The child explained the green part in the picture was the screen. She said that the red rectangular box was the buttons used to adjust the light and dark. She also explained that the orange box with some buttons which were for pressing and some English appeared on the screen when pressed.
	The child explained that his computer was in black color. He said that there were some green lights twinkling at the bottom of his home computer and s/he did not know why it twinkles. He drew two mouse, one linked from the computer and one linked with the hard disks, then, he named the mouse which he drew and said it was for clicking. He also explained the two rectangular box were for switching on the computer but he did not know its name. He then replied that he forgot to draw the speakers but he said that speakers should place on two sides of the computer.
	The child drew a tiny circle on the left bottom corner of the computer and explained that it was the power button. She also wrote 'MENU', 'AUTO' and drew two triangles along the power button. She said that they were the electronic buttons. She named the mouse which linked from a separated box next to the computer. She also named the keyboard though there wasn't

	any buttons on it.
	The child drew a pink rectangular box represented the display. S/he named the mouse which linked from the keyboard and explained that it was for clicking. S/he drew a keyboard without numbers and letters, then s/he said the squares on the keyboard represented the buttons.
	The child drew a brown rectangular and did not name it but said she forgot to draw something on it. She explained that the words, Admin, Alice Yeung and Daisy on the screen were copied from the computer.

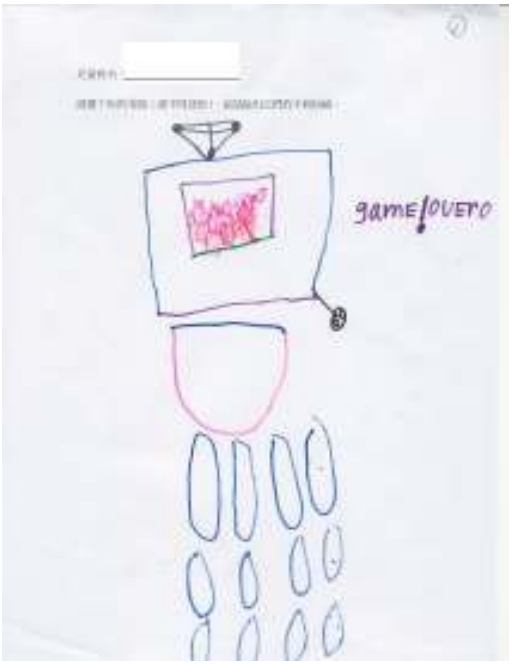
Appendix 6.e: Children's Drawing and Explanations – Group 5

Children's drawing	Explanation
	The child drew a green box represented the computer and a spaceship was drawn next to it. He explained that the brown rectangular box was a car and it was below the computer. He said it was a mini bus with television and two circles represented the passengers on the mini bus. He also drew five circles represented the wheels of a car.
	The child said it was an invisible computer. She drew five squares in different colors at the left bottom of the screen and said they were for choosing the background colors. She also drew and named a mouse which was on the left side of the picture. She drew a headphone linked from the keyboard a cable with heart shape which was used to switch on the hardware. There were a 'x', '☐' and '-' on the right top corner of the screen. She explained that the 'x' was for closing the window, '☐' was for enlarging the window and '-' was for minimizing the window. She said the flowers were for decoration. She also said her computer got some numbers and letters on the button of the keyboard.

	The child explained that she drew a 'Hello Kitty' computer and named the display was for drawing pictures on it. She also drew a blue rectangular box represented a hard disk and said that the pink drive was for small disk. She then explained that the green circle under the pink drive was the reset button. She drew a headphone linked with the computer and said that it was for listening when placed on ears. There were some icons on the screen, she explained that the one was for 'EVI' (the educational platform) from which she listened to the stories there; Then the other one was the recycle bin. When the recycle bin icon was clicked, a trash folder was appeared. The four stars on the screen were the stickers. She also drew a 'X' and 'l' on the right top corner for the screen which she explained that the 'X' was for 'stop' and '1' was for 'restart'. On top of the picture, she said she drew a copier to copy things from computer. She finally explained the objects above the computer were the four key rings from her friends.
	The child drew an image in a rectangular box and said it was inside the computer. He did not name it was the screen. He then drew some stars surrounded the computer and explained that they were for decoration only. He also drew two speakers on the side of the computer and said they were for listening but did not know its name. A mouse was drawn linking from the side of a keyboard and she said that it was for moving the

	cursor. He explained that the purple box represented a keyboard for typing but she did not know its name.
	The child drew some flowers surrounded the computer. The purple part on right hand side was a flower pot. She drew five circles and explained that they were buttons for pushing and then, some cartoons appeared. Se also drew a speaker and said it was placed on ears for listening.

Appendix 7.a: Children's Drawing and Explanations – Group 1

Children's drawing	Explanation
	The child wrote the words 'Game Over' and 'On' on the right of his drawing. He explained that the circle next to the word 'On' is for playing games. He said there were letters in the rectangular box next to the 'On' but he did not know the proper name. He also drew and named a mouse next to the rectangular box and said it was for controlling the computer though he couldn't explain how to control it.
	The child drew a triangular object on top of the square. She explained that the three buttons on the triangle were used as charger to charge up the computer and when the computer was not working, pressed these three buttons to restart. The twelve circles at the bottoms of the drawings represented the people playing the computer. She said the semi-circle in the middle was a chair. She further said that the pink in the rectangular object was the glass and she did not name the screen properly. There was a mouse linked from the right bottom of the rectangle but she did not explain and name it. She copied the first child to wrote 'Game Over' next to the rectangle and did not explain it.

	The child drew one green and one blue oval objects in his drawings and explained that they were the machines which were used to switch on and off the computer. He said the rectangular object in the middle of these two machines was used to play games when pressing the buttons. He said the rectangular part was a computer and it was blue when it was shut down. He also explained the two wires on the top of the computer were used to open the computer to repair when the computer did not work. He named the computer properly but did not name the screen.
	The child said she drew a keyboard with some letters in alphabetical orders on the buttons. She also drew and named a mouse which was linked from the corner of the computer. She said that the computer was not turned on, so there was nothing there. She could not name the screen properly.

Appendix 7.b: Children's Drawing and Explanations – Group 2

Children's drawing	Explanation
	The child drew and named a keyboard with buttons without any letters or numbers on them. He also drew and named a mouse, then, he explained that it was for clicking. He drew a rectangle in the middle of his drawings but he did not explain it.
	The child drew a rectangle with some buttons on the sides. She explained that the screen is switched on when pressing these buttons. She named the yellow rectangle was a keyboard for pressing. She said that she forgot to draw a mouse in her drawing.
	The child drew a human like object as her computer. She explained that there was a human face on the rectangle represented a human with two hands on the sides. She said the middle part where she wrote 'K3B' was used for drawing too but she did not name the screen properly. She also drew a rectangle in orange and said it was for pressing the mouse. However, she did not name the orange part as keyboard.

	The child drew a computer with two rectangular objects on both sides. She did not name and explain what they were. The computer was surrounded by some buttons on the frames but the girl did not name and explain them. She wrote some letters on the screen such as, ‘e’, and ‘a’. She also drew a keyboard with some letters on it but she did not explain the function of the keyboard or name it properly. She then drew a mouse next to the keyboard; again, she did not either explain or name it.

Appendix 7.c: Children's Drawing and Explanations – Group 3

Children's drawing	Explanation
	The child drew a rectangle on top of the computer and said it was a keyboard for typing. He explained the big square in the middle of the drawing represented the computer and he drew some icons on the screen. There was a cursor and he said it could be moved by pressing the button. He explained the purple rectangle at the bottom of the drawing was used for opening the computer but he could not name it properly. He also drew a mouse linked from the bottom of the computer but did not explain its function.
	The child drew a square represented his computer screen but he did not name and explain it. He also drew a mouse at the bottom of the computer with a plug facing the electrical socket. There was a keyboard shaped object next to the mouse, again, he did not explain and name it.
	The child drew a computer in the middle of the drawing. She explained that there was a girl dressed up on the screen and there were different tools for selections surrounding the screen. There was a mouse on a mouse pad linked to the wire of the computer but she did not name and explain it. There was also a rectangle with buttons on top of the computer, again, she did not explain and name it.

	The child drew a square with an orange frame as the screen of the computer as she explained. She also drew a mouse and a keyboard at the bottom of the computer though she did not name and explain how they work. There was a black rectangular box next to the computer and she said it was for switching on the computer.

Appendix 7.d: Children's Drawing and Explanations – Group 4

Children's drawing	Explanation
	The child drew a rectangle and in the middle of the drawing and named it as computer. There was a keyboard with buttons without any letters or numbers on it below the computer but she did not explain it. Besides, there was a mouse linked from the keyboard and she explained that it was used to control the computer.
	The child drew a rectangle as the computer screen but he did not name or explain it. On the screen, he drew some human images and there were some little boxes surrounded the screen. There was a circle next to the computer but again, he did not name and explain it.
	The child explained that the orange object on top of the rectangle was used for listening but she could not name it. She said the rectangular part in her drawing was for showing images but again, she did not name it. She explained the other rectangle below the computer was for typing and she did not name it as keyboard. Besides, she then only explained the object next to the keyboard was used for moving the cursor, again, she did not name it as mouse. She explained the lengthy objects on both sides of the computer were the wires.

	The child drew a big rectangle represented the computer though he did not name it. He explained the images on the screen were the games. The orange part at the right bottom of the screen was the 'start' icon as he said. The six circles which were drawn on the right of the screen were buttons for pressing. The orange rectangle below the computer was for switching on the computer though he could not name it. He explained and named properly that the pink object represented the mouse and was used for controlling the computer.
	The child drew a blue rectangle represented the screen of the computer but he did not name it. He only said there was a 'start' icon at the left bottom of the screen. There was a long rectangle at the bottom of the drawing, he explained that it was used to switch on the computer but he did not name it. There was a mouse below the computer, he named it and explained that it was for controlling the computer.

Appendix 8.a: Children's Drawing and Explanations – Group 1

Children's drawing	Explanation
	The child drew six circles on the screen represented the six clouds of a computer game. She also drew a mouse linked from the right bottom of the screen and named it properly. She explained that the orange rectangle was the filter of the screen at home to protect it from damage. She said her computer at home was scratched by a pencil. She also drew a keyboard like object with some letters on it. She did not explain or name the keyboard.
	The child explained the black square in the middle of her drawing represented a computer. She wrote some letters and numbers on it and said that she typed on the letters for her name. She also drew a speaker next to the computer and named it properly. She introduced that there were two buttons on the speaker to adjust the volumn of the speaker. She lastly explained there was a mouse linked from the right bottom of the computer. She named it properly.

	The child drew a square and explained it was the screen of the computer. He drew a child next to the computer and said that he wanted to play with the computer. The squares under the computer were the key of a keyboard. He did not explain a mouse liked object between the computer and the child in his drawing.
	The child explained that there was a drive at the left bottom of the computer which was used for inserting the DVD that was for playing games. He said that the human liked object represented a 'superman' who was fighting with monster.
	The child drew two rectangles with letters and numbers on them. The numbers were not in sequential order. She explained that there was a headphone next to the happy faces and she could hear some sounds when wearing the headphone but could not speak with the headphone. She did not name the parts of the computer including the headphone.

	The child drew five ovals vertically representing the main menu of the computer activity at computer centre of school. She explained that the rectangle at the right bottom was the icon of 'back' for going back to the previous page. There was a mouse linked from the left of the computer but she did not name or explain it. She also drew a keyboard liked object with some letters on the top row but the order of the letters was not the same as a real computer.

Appendix 8.b: Children's Drawing and Explanations – Group 2

Children's drawing	Explanation
	The child drew a cable to connect the computer with the keyboard. He explained that the black rectangle was a frame to support the computer. He drew a mouse linked from the bottom of the keyboard and explained that it was used to control the computer. He did not name the mouse properly. He also said that the rectangular with some boxes was used for typing but did not name the keyboard.
	The child drew two computers in her drawing. She explained that the top one with pink frame was a real computer and the bottom one in yellow was a fake computer. She said that the numbers on the green rectangle were used for pressing. However, she did not name it was a keyboard. She also said that the purple rectangle was used to insert disks that for playing. Again, she did not name the hard disk. She said there was another object that used for inserting the disk on top of the computer.
	The child wrote the 'XP' at the right top corner of his drawing and he said it was the name of his computer. The rectangle stood on the right was used for storing disks which were games. He explained the colorful rectangle was used for playing games but he did not name the keyboard properly. He also said that the white rectangle on the left was used for sound but he did not name the speaker. He finally explained the

	red circle represented the headphone that for hearing sound though he did not name it.
	The child drew a green rectangle represented a frame for the computer. He explained that the pink boxes were the keys for playing games. There was a mouse next to the keyboard and he named it properly. He drew a $100 dollar note next to the computer and said it was used for shopping in the computer game.
	The child explained that the grey rectangle on the right was used for adjusting the volume but he did not know its name. He wrote the value of the computer was $1 and the mouse was $5 in his picture. He said the pink rectangle with boxes was for pressing but again he did not know its name. He drew a person who sat in front of the computer. Lastly, he said the yellow circle at the right bottom of the computer was used to switch on the computer when pressed.
	The child explained that he drew a rectangle with 'DVD' on it which was used for pressing the buttons when he inserted a disk into the computer for playing games. He said the computer games must need a disk to play games. He wrote some letters and numbers on the keyboard but he did not name it. He also explained that there was a paint brush in his picture that was used for drawing in the computer.

Appendix 8.c: Children's Drawing and Explanations-Group 3

Children's drawing	Explanation
	The child explained that the square represented a computer in his drawing and there was a robot in his computer. He said the rectangle below the computer was used for pressing on the buttons but he did not name it. There was a mouse linked from the key board. He said it was used for pressing but again he did not name it.
	The child named the green rectangle was a keyboard that was used for pressing. He said the buttons at the bottom of the screen were used for switch on and off the computer. He also explained that he drew a mouse which was cordless and when the mouse was clicked, he could play some games.
	The child explained that the object on top of the computer was a camera for watching but she did not know its proper name. She drew a keyboard and a mouse in her picture but she did not explain them.
	The child said that there was a kitchen on his screen of the computer. He pointed to the centre of his picture and said it was the screen. He said the triangle was to support the computer but he did not name it. He introduced that he drew a mouse and there was a sticker on the top of the mouse for clicking. He named the mouse properly. He also said that the rectangle at the bottom was used for typing but he did not name it.

	The child explained that it was a math game in her drawing. She wrote 1-1, 10-100 on the screen that represented the subtraction. She drew a mouse linked from the computer on the left and she named it properly. She said the mouse was used to click the games. For example, she was required to answer the math questions in the game correctly. She introduced that the green object on the right was a headphone that used for listening to sounds.
	The child explained that the blue rectangle on the left was used for listening to sounds but she did not name it. She pointed to the blue rectangle again and said she inserted some disks in it. She introduced that the human object was on the screen of her computer. She drew a keyboard below the computer but she did not mention it.

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