

CHAPTER 3.5 SPECIAL SCHOOLS

In the specification of this study, there was no mention of special schools as a separate school category that the study has to address in reviewing the progress in the implementation of ITed. In drawing up the design for this Study, the ED expressed a strong wish for this Study to address this. The team had expressed very clearly at that point that to really address this problem requires a totally separate design. In fact, the issues and problems and thus the goals for implementing IT in education may be very different even across different types of special schools. Thus the research team had made it very clear right from the start that it was not possible, within the constraints of the current study to design a set of questionnaires that can really cater for special schools. However, the team did agree to include special schools in the survey, though some of the questions may not be applicable, just to see if there is anything that may emerge from the results. The team also agreed to conduct two case studies of special schools to shed some light on how special schools are making use of IT for teaching and learning and the issues and problems they faced in the process. As the number of special schools taking part in the survey is very small (16) and the low response rate for some of the items, especially the student questionnaire, that it is dangerous to draw statistical comparisons on special schools on the basis of the survey results. However, the descriptive statistics for the special schools are reported alongside those for primary and secondary schools in the appendices for reference. Some comments will also be made on a couple of the survey descriptives at the end of this chapter. The main bulk of this chapter comprises a set of three reports on case studies conducted on special schools in this study. They do illuminate the complexity of the situation in special schools as well as some of the ways teachers and students in special schools are making use of IT.

3.5.1 Case Selection

As no special schools were studied as part of SITES M2, and only one was included in the set of case studies conducted in as part of SITES M1, it was agreed that in order to provide an opportunity for us to draw on the case studies results from module 1, the case study school studied in M1 was selected as one of the case study schools in this study. This was a school in the physically handicapped category. The research team also consulted members of the Steering Committee who had good contacts with special schools, and had knowledge of schools that were actively engaged in some form of IT integration in their school curriculum. A school that belonged to the severely mentally handicapped category was selected on that basis. In addition, another special school that belonged in the mildly and moderately mentally handicapped category voluntarily expressed interest and agreed to participate in both the case study and survey components. The research team decided to include this school in the case study as it was expected to provide a better understanding of the implementation of IT in another category of special schools. Thus in all, three special schools were selected for case studies for the REITED study.

3.5.2 Research Methods

It must be noted that the research purpose and thus the research design for these case studies of special schools were different from those used in the SITES case studies. In the SITES case studies, the focus was on evaluating good and innovative pedagogical practices, which involved

the identification of at least one such practice to be studied in the school, followed by a series of classroom observations related to the practice, interviews with classroom teachers and students in the class as well as an examination of documents pertaining to the teaching practices followed. Such in-depth studies of classroom practices were not conducted in these case studies as the focus of study was on gaining an overall understanding of the implementation of IT in education in these schools at a more general level across the school.

3.5.3 The Different Categories of Special Schools studied

According to the categorization used in the ED, there are 11 categories¹ of special schools in Hong Kong. Each of the three case study schools came from a different category. One of the schools studied catered for the physically handicapped children. These children were thus generally of normal intelligence. On the other hand, the other two schools studied catered for children with varying levels of mental retardation. A description of the classification of mental handicap is warranted here.

In the Hong Kong Review of Rehabilitation Programme Plan (1994/95-1998/99), there are descriptions of the distinctive features of persons with different degrees of mental handicap in western countries, which classify the mentally handicapped people into four categories. They include “mild grade” with I.Q. 50-55 to approx. 70, “moderate grade” with I.Q. 35-40 to 50-55, “severe grade” with I.Q. 20-25 to 35-40 and “profound grade” with I.Q. below 20-25.

In Hong Kong, mentally handicapped children are generally classified into 3 categories, namely mild grade, moderate grade and severe grade according to their intellectual assessment results. They are being placed into the following types of schools: schools for mildly mentally handicapped children, schools for mildly and moderately mentally handicapped children, schools for moderately mentally handicapped children and schools for severely mentally handicapped children. This case study school belongs to the category of schools for the severely mentally handicapped children, whose I.Q. below the range of 20-25 in broad terms and who display minimal capacity for sensory-motor functioning during the pre-school period, and is equivalent to the category of schools for the “profound grade” in western countries.

3.5.4 Case Report on School in the Severely Mentally Handicapped Category

3.5.4.1 School background

School history

The school was established in 1981 by a Christian organization. It was the fifth school established for the severely mentally handicapped in the territory. All the students were assessed and placed in the school by the Education Department. The students come from Hong Kong Island and the other outlying islands.

There are 8 classes in the school, which include 4 classes in the primary sector and another 4 in the secondary sector. There are 62 staff members in the school comprising 14 teachers, 4 teaching assistants, and 44 non-teaching staff such as educational psychologist, social workers, nurses, physiotherapists, occupational therapists, speech therapist, etc.

¹ Categorization is made for administrative purpose.

In the 2000-2001 school year, the school had an enrolment of 54 students, in which 32 students were residential students. The students were aged from 6 to 16, who had comparatively low abilities in terms of learning or managing themselves in their daily life activities. Some of the students had other handicaps, such as visual or hearing impairment, physical handicaps, autism or Down's Syndrome.

The children's disabilities and learning needs

According to the characteristics described in the school homepage, the severely mentally handicapped children have comparatively short attention span and difficulties in memorizing things. They are likely to experience difficulties in learning subjects that require abstract thinking and complicated learning strategies. They also have difficulties in language development and motor co-ordination, which may in turn affect their personal and social development.

Children's learning difficulties stem from a variety of causes. Some of the children suffered from various degrees of visual or hearing impairment, others suffered from medical conditions such as autism or Down's Syndrome. The inability to learn might also stem from emotional or behavioral problems that were short or long term. Moreover, they had difficulties in self-care and in interacting with the external environment. These children display minimal capacity for sensori-motor functioning during the early years, and the worst scenario could be cases where the children have no response to the environment and the people around them. All the above-mentioned abilities that these children lack are the important pre-requisites for learning to take place. Obviously, the learning goals in the mainstream school curriculum are inaccessible to these children and no learning can take place unless the children's abilities to interact with the environment can be greatly advanced. A highly structured environment, with constant aid and supervision, and an individualized relationship with a care-giver are essential for optimal development of these children.

The learning goals

In the school homepage as well as the school IT plan, it was stated that the school has five core missions:

1. To help children develop their potential and cope with their daily life;
2. To provide supportive services to parents in order to help them face and solve the problems in caring for their children;
3. To enhance the professional development of staff, and to encourage understanding, mutual support and team spirit among staff;
4. To enhance the understanding and acceptance of disabilities by the community, and to help the parents and students adapt to life in the community;
5. To provide quality service by the full utilization of resources.

As the principal stated, "The school aims at providing education and rehabilitation training opportunities to students, so that they can, step by step, acquire the generic skills that they will need most in helping them adapt to life in the community." Since the children have different combinations of a wide range of disabilities, the curriculum needs to be tailor-made to meet the abilities and learning needs of each individual child. To meet the needs of the children each of whom has his/her own combination and profile of multiple handicaps, much expertise is needed to design a tailor-made care and learning plan for each individual child in the school. Specialist

staff in the school such as educational psychologists, social workers, physiotherapists, occupational therapists, speech therapists, etc. will form a group to set up realistic learning goals for each child by adapting the existing curriculum to meet the child's needs and design plans for implementation. In addition to designing learning activities, the joint involvement of professionals of different disciplines is necessary to cater for the children's health conditions as good health and general well-being are also important factors for achieving the learning goals.

The school recognized modern technology, especially ICT, as potentially excellent sources for tools to enable the children to become more motivated to explore new things in the environment and to develop progressively. It was believed that the "assistive technologies" could heighten the sensory awareness and stimulate the children's motivation to interact with the external environment. Thus, much effort had been put into preparing the children to learn basic skills by using various kinds of "assistive technologies" in the school as they could only actually learn cognitively after these skills had been mastered. The specific implementations of IT to support teaching and learning in the school will be described in later sections.

Besides serving the children from the perspective of teaching and learning, emphasis was also put on the full utilization of school resources through the effective use of IT. Technology was extensively used in school administration and as well as in the management of teaching and learning (keeping a systematic record of the children's treatment, activities and progress). Since the technology greatly minimized the administrative workload of the staff on paperwork, more time could be spent on catering for the individual learning needs of children, which was always the top priority of the school's mission.

Another priority of the school was to provide more support to parents so that they could help in supporting the children's development. One initiative that the school was exploring was to set up real-time remote classroom observation through the internet so that parents can have a better understanding of how the disability influences the children's development and how they respond to different situations.

3.5.4.2 Different uses of technology in supporting teaching and learning

As a productivity tool

As children in this category consisted of combinations of a wide range of severe physical, sensory, learning or emotional difficulties, it is therefore essential to involve various kinds of specialist staff such as educational psychologists, social workers, physiotherapists, occupational therapist, speech therapists, etc. in contributing to the enrichment of the curriculum in terms of their professional knowledge and experience. All members of staff had to understand the children's learning needs to enable them to see the different parts of each child's curriculum as an integral whole. Thus communication and coordination amongst different teaching and non-teaching staff are extremely important. IT was used extensively to ensure the smooth coordination and management of activities in the school. The aims of using IT in school administration and the management of teaching and learning was to minimize the administrative workload of the staff on paperwork so that teachers could spend more time catering for the individual learning needs of the children.

As a sensory stimulation and motivation tool

In order to heighten the sensory awareness of the children, technologies were used to enhance stimulation by giving stimulus and providing a variety of attractive and/or encouraging feedback to children. Such setups could motivate the children's interaction with the external environment. In this regard, many specially designed peripherals and equipment, as well as custom hardware and software were necessary for supporting the children's learning.

As a tool for enhancing cognitive development

For the comparatively more advanced students, they could interact with computers to learn some basic concepts such as color and shape. Often, assistive technologies such as some input or output devices and special adaptations of the software would be necessary to help these children to overcome their physical limitations in order to achieve the desired cognitive development.

3.5.4.3 Requirement on IT - the need to be flexible and adaptable

It is important to realize that the learning difficulties of the severely mentally handicapped children's were so complicated that these children would not be able to follow the curriculum in ordinary schools. Thus there was a demand on curriculum support for these teachers. However, most of the software designed for normal children are not suitable for the children in this school. Even software designed for young children would be too complicated so that these become too distractive. These children were cognitively not able to handle such "complicated" learning environments. Thus the school has been developing some specially designed modular program/software that can be broken down into a number of concrete learning targets to support teaching in the classroom so that a child can learn intellectually at his/her own pace. Many of the teachers in this school had a strong desire in learning how to author learning software so that curriculum resources could be tailor-made according to the children's specific needs.

3.5.4.4 Use of IT in school

From the discussions with the ITC and the principal, the information on the school homepage and the documents provided by the school, it is evident that the school had a lot of experience and a long history in IT implementation. The different development stages of using IT could be illustrated from two main dimensions: Use of IT in school administration and in management of teaching and learning, and Use of IT in teaching and learning.

Use of IT in school administration and in management of teaching and learning

<i>Year</i>	<i>Uses</i>
1993	1. Using word processing software to update school documents. 2. Using spreadsheet for school administration and management of assets, budget, accounts, staff salaries, personnel, and library etc.
1994	1. Using editing software for the school publication.
1995	1. Using software for graphics to update the <<學校程序手冊>>. (School Procedures Handbook)
1997	1. Using self-developed programs (developed using Visual Foxpro) to manage students learning data and administrative tasks.
2000	1. Using the financial management system of SAMS. 2. Using self-developed intranet system for other functions of the school administration and management. It includes management items like venue, audio-

	<p>visual facilities, library books, teaching materials, teaching aids, maintenance work, school calendar, school message, human resource, training and development, school bus service, school workshop, appraisal and outside work*. Those databases relating students learning data developed using Visual Foxpro were also integrated into the Intranet.</p> <p>*All staff members can access and request the various administration resources from staff room, classroom, or even from their homes through the school intranet.</p>
At present	<ol style="list-style-type: none"> 1. Connecting school Intranet to the school homepage constructed in 1996 that provides information of school service to others. 2. Preparing seminars on the digital materials and micro-teaching materials for staff's self-learning through Internet as well as for peer observation and evaluation on teaching and learning.

Use of IT in teaching and learning

Year	Uses	Obstacles	External Support
At the beginning of 1990	1. Having a desire to start using computers in teaching and learning but found it very difficult to implement due to lack of appropriate hardware and software provisions.	1. The provisions of the hardware and software could not meet students' needs.	Founding Organization
1994	1. Participated in a <<電腦教學計劃>> (Computer Education Program) organized by the ED for special schools	1. The provisions of the hardware and software provided were out-dated. 6 out of 9 computer provided were too old. The development of computer-assisted learning was slow due to lack of resources.	Education Department
1998-present	1. Developing school-based software by using a concept of "Authorware" for teaching and learning	<ol style="list-style-type: none"> 1. The software available for public is inappropriate for the children as it contains so much distractions that the children are not able to learn. 2. Most of the theme-based software are designed and produced based on needs of a particular school or group of students. Teachers found it difficult to source the appropriate software tools for them to use. 	Education Department & QEF

As the principal stated, "We should not have worries about that the lesson will be led by the software tools as there has been breakthroughs in developing software. The way we use IT in school solely depends on the genuine needs of our children." For this school, the use of "authorware" to develop software was important because this provides teachers with the right to change, edit and develop the software with specific learning objectives for a class, a subject, or even a child with their individual needs. Thus the situation of the practitioners becoming too dependent on the software could be avoided.

3.5.4.5 Most desired way of using IT in teaching and learning

As stated earlier, in order to meet the individual needs with multiple handicaps, much expertise needs to be involved in designing plans for individual children. For each child, there would be a specific group formed from specialist staff in the school to set up realistic learning goals by adapting the existing curriculum to meet the child's needs and plans to implement them. The focus of the discussion would be the general skills that the child would need in the future, which they named as <<生涯規劃>>. Next, they would examine the resources/facilities available in school, such as the multi-media room or various kinds of software that might contribute to the child's development, or any other assistive physical devices necessary to facilitate the child's learning. They would then think about how IT could help that particular child to learn and acquire each of the skills targeted for learning. Most importantly, children were encouraged to use technology as a tool to enable them to participate actively in their everyday environments and routines. One example of such application provided by the school was the use of "smart card" to record the frequency of using the toilet for some children in order to monitor their health conditions. This indicates that it is the individual needs of a child that determine the child's curriculum and how IT can be used to support teaching and learning. As emphasized by the principal, "the school adapts to the needs of the children by using various kinds of technologies instead of IT leading the children's curriculum."

One common objective in using IT in various class activities was to enhance the children's motivation to learn. It is important as children with multiple physical and cognitive disabilities frequently lack functional or socially appropriate ways to communicate or interact with their environment. In fact, they may demonstrate little interest in or response to people, objects, or activities. However, as stated by one of the teachers, as a result of modern technology, adaptive computer equipment had assisted children with disabilities in facilitating responsiveness as well as functional communication and even enabled them to become more "formally educated". Therefore, an emphasis was put on the easily adaptable software so that the curriculum could be tailor-made according to the children's needs.

Another use of technology was to provide opportunities for comparatively more advanced children to explore and learn cognitively in the classroom. The learning goals that were developed for these children were more complicated and closely related to their daily lives. While developing meaningful ways for individual students with multiple disabilities to communicate and interact with their environment should be a priority, developing effective evaluation and treatment methods to meet these needs should not be neglected. Therefore, technology was used as an effective tool for the ongoing record-keeping of children's progress as it would ensure that teaching procedures would be consistent and continuous, which would in turn ensure that the planned programs would match the actual progress of the children.

3.5.4.6 The implementation strategies

Infrastructure

Years	Development stages	Hardware/Peripherals/Software	External support
Since 1987	1. A “computer work group” <<電腦小組>> was formed by 4 special schools under the same founding organization, 1 adult education & vocational training organization, & 3 pre-schools, which aimed at applying IT in children and adults’ learning and training.	1. 2 computers (1 Apple II & 1 Atari); 2 monitors (only 1 with colour screen); 1 printer. 2. Then, provided with 1 more IBM PC; 8088 central processing unit; 20-MB hard disk; & a keyboard. 3. Other input devices like hitting pad, mouthstick, & touch screen etc. 4. All software was owned by respective organizations, but could be borrowed through central registration.	Founding organization of the school
1994	1. Participated in a <<電腦教學計劃>> (Computer Education Scheme) organized by the ED for special schools	1. 9 computers 2. Provided with about 40 computers (PC & Macintosh), some of them were linked up by LAN	Education Department Donations
1996 – 1998 2000 – present	1. Constructed 3 multi-sensory rooms 2. Aimed to design classroom activities/lesson plan by using multi-media learning approach	1. Fully utilizing the existing school facilities, resources from ED and other organizations	<<華人永遠墳場基金>>

In order to heighten the sensory awareness of the children, technologies were used to enhance stimulation by giving stimulus and providing much various kinds of feedback to children. It could also motivate the children’s interaction with the external environment. Therefore, the focus of the school was on many specially designed peripherals and equipment, as well as hardware and software were needed for supporting children’s learning.

School IT implementation process

Initial analysis was made of 8 typical students of different levels of physical and mental abilities to identify their learning difficulties and to investigate the role that IT could play in enhancing the learning process and how it could be achieved at an individual level. “For the students with disabilities”, the ITC said, “the first step is to see what adaptive devices will best and most comfortably accommodate their needs, such as a chair with special design to assist the student to sit upright. The visually impaired student must learn how to access a software program that will enlarge the print on the monitor.” It shows that before the student can actually learn with IT, his/her disability must be accommodated. Such devices/preparations for learning with IT is costly

according to the Principal, and these needs had not attracted much attention in terms of government funding.

Next, feedback was sought from the teachers regarding the difficulties anticipated in implementing IT in the classroom activities as it would be far more complicated in the things happened on a group of students with mixed disabilities in reality. There would be staff development activities organized on every Wednesday, Friday or Saturday for staff to express, share, or discuss about the issues like school curriculum, education reform etc. and obviously there had been lots of discussions about how IT could be effectively implemented in the school curriculum among staff.

In order to get additional grants from sources other than the ED to enhance the effective implementation of IT, the Principal and ITC were the main persons to draft the proposal. The focus was mainly to get funding for specialized peripherals and devices to enable the students to actually make use of the ICT facilities provided by the ED. The drafts of proposals would be put up at the school Intranet for staff members' further comments and suggestions. It was believed that such process would help articulating the students' needs and the objectives of applications and enrich the proposal content. Another important aspect was that it gave the opportunity for teachers to be part of decision-making process for the school initiative proposed. The principal thought that it was necessary if there was to be effective implementation of the integration of IT in school curriculum as it allowed those asked to change/play a role in the initiative to "own" the change/initiative.

An "online education support group" was set up on the school Intranet where the teachers could raise their problems and request support. The Principal acted like a supplier, would try very best to provide support but surely not be a strong leader to impose any changes. Nowadays, as a professional teacher, one should be more independent and capable of solving problems encountered during the process of teaching and learning. As the principal emphasized, "The school will provide resource/support only if the teacher have expressed their needs; otherwise such resource will not be found useful by the teachers themselves and the valuable resources will be wasted." It implied that "timing" is an important factor in effective use of resources that we should not neglect.

It was stressed that the resources were allocated according to the needs "explicitly expressed" by the users – teachers, based on students' needs. The basic principle was that all facilities belonged to the school and could be shared among staff by booking through the school Intranet. Priorities would be given to larger group of targeted students and those who had less access to that resource. The above principle was applied to all the bookings of school facilities, such as the multi-sensory room, physiotherapist's room, and the use of computers, etc. And this practice allowed different activities to be run at different venues at the same time and ensured the effective utilization of school resources.

Staff development

On reviewing some school documents such as the "Teacher Training Plan", IT plans, as well as the ITC application proposal, it is apparent that the school has made continuous efforts to train the teachers for years. According to the "Teacher Training Plan", it was noted that an evaluation had been underway to identify what the training needs of the teachers were and which modes of

training they preferred before the first term ended this academic year. Some recommendations were made after considering the content of courses at different levels of IT competency, teachers' interests and abilities, as well as the ability of the school to run a school-based training course, and the strengths/characteristics of a course provided by other service providers commissioned by the Education Department.

As most of the teachers in the school reached at least the "basic" level of IT competency, they showed interest only in the component courses regarding the "Applications of Educational Software" that was included in the BIT course. There was a strong desire to learn about the production of software, "Production of Multi-media Teaching and Learning Materials", as well as authoring languages (e.g. Authorware). As a few of the teachers had not fully grasped the skills of "Basic Word Processing", an important tool for effective handling of teacher's daily paper work, internal training on such topics were provided by the school staff.

As most of the teachers have reached certain levels of IT competency and some of them were even capable of conducting training for others, so internal training on webpage design, production of multimedia teaching and learning materials as well as databases etc. was suggested to be run by the teachers themselves. In order to understand more about the content and details that should be included in the course, the "potential trainers" might enroll in some other similar courses provided by other organizations before they start the course.

In-house training regarding the specific needs of the school was suggested to be provided by other organizations. These included courses on areas like the "application of spreadsheet" or "use of IT in teaching and learning" etc. It was expressed that they much appreciated the "flexibility" allowed on the choosing the most appropriate training mode the school needed. While there were some vendors from outside who provide different kinds of training, the school could still choose to run it on an internal school-based mode. It would not only save much of the time, but also enhance the effective use of resources due to the "flexibility" allowed as the specific learning needs of the teachers could be addressed.

While considering which course provider would be most suitable for the school, some teachers enrolled in some other similar courses provided by different organizations so that they could compare the quality of different courses before they had reached a final decision. It was expressed that "internal trainers" would benefit a lot during the process of conducting the internal training as they would have a deeper understanding of the development of the teachers in terms of their expectations and difficulties encountered while using IT in various aspects of their school lives.

Technical support

In rendering support to school, the government provided an IT coordinator, and 0.5 technical support staff for providing contract technical service. Also a teacher who was mainly responsible for developing school-based software was employed under the QEF for two years. In view of the increasing demand on the technical service in school, an extra technical support staff was employed under the school's administration grant. It was expressed that there were some important roles that we should not neglect. They included: an IT coordinator, who was responsible for promoting and taking charge of all IT-related teaching and learning activities, a full-time technical support staff for providing service to resolve the problems faced by the staff,

and a teacher for developing various kinds of school-based software. As the principal said, “Without any one of them, we could hardly see any development on IT implementation, especially in special schools”. All of them played an important role during the implementation of IT in the school as well as the future development of the school.

3.5.4.7 Difficulties encountered and resources/support desired

It was reflected that, for most of the children, it had been a long and tedious path, full of obstacles that had to be circumvented. Unlike the non-disabled ones, children with strong limitations needed to be trained “to interact with the environment” (i.e. realize the need to respond and know how to give responses) before they could learn through using the required software in computer. Therefore, progressive basic training on attention focusing, hand-eye coordination, visual tracking and judgment, and even on realizing the need of one’s cognitive development etc. - all of this had to be mastered through the integration of IT before the children could approach the keyboard and monitor. That is the reason why the first step that the teachers would do is to see what adaptive devices will best and most comfortably accommodate their needs. For example, a physically handicapped student who is limited in arm, hand or finger movements needs equipment that enables them to access computers more comfortably.

Though the practitioners in the special schools had recognized the importance of assisted technologies for the effective implementation of IT, hardly any feedback could be found from the Government regarding the extra funding/support that caters for the specific needs of special schools under different categories. Though, at present we still can see the proactive role the school is playing as while it had been trying hard to utilize the resources allocated by the Government, it didn’t stop finding a way of effective use of resources and out-sourcing extra resources to make changes happen.

3.5.4.8 Future needs and expectations

We all know that the Internet contains a vast amount of information, resources, software, and links to other special education professionals around the world. One obstacle, however, is that it takes a considerable amount of time to discover the specific special education sites that contains the best information for the teachers. Teachers have very little time or opportunity to explore the far corners of the Internet. So it seems that some professional support in exploring the methods and connections that will put teachers in touch with valuable information is needed.

Moreover, it was reflected that the Government had not adequately addressed the specific needs of special schools under different categories. Teachers in this school seldom sought support from the ITERC, which was supposed to “advise schools on the use of IT across the curriculum, development and implementation of school-based IT plans and preventive maintenance of IT equipment”, as stated in the Government’s 5-year Strategy. In fact, since there were already so many aspects of IT that the ITERC needed to take care of, some special education related issues, like how IT can help students’ individual needs as well as develop their own knowledge and skills, were inevitably left for schools to explore. Other functions such as to “disseminate information on and facilitate development of educational software; plan IT training for teachers; and facilitate sharing of expertise and IT-based teaching materials among schools and teacher” have already been performed by the school for a few years. As regards to the role of “facilitating

the sharing of expertise and IT-based teaching materials amongst schools and teachers”, the school played a significant role for the other special schools. It welcomes visits or sharing sessions organized by the practitioners from the same or different category of special schools, which involves some non-local visitors from Mainland China.

While the Government’s focus is on the effective implementation of IT in education, it was stressed that the provision of rehabilitation aids and IT-based teaching materials/software, which is thought to be the basic criteria in enhancing the development of IT in special schools, should not be neglected. The government policy – “Information Technology for Learning in a New Era - Five Year Strategy” has direct bearing on curriculum development including that for children with special education needs. It seems that the need to synchronize the design of suitable school-based software development is essential to the effective implementation of the strategy. In fact, the school may be considered as being a step forward from the initial stage as the teachers had experience in developing some school-based software. And the Social Welfare Department has already requested some of the stock of software for their reference.

Though the school had such a rich experience in using IT, the principal expressed that they would not initiate any sharing activities externally by themselves due to the time and manpower constraints. On the other hand, he still thought that the school had the responsibility to provide any information and share their experiences that would benefit to others. It was suggested that additional support/resources should be given to those schools having positive/successful experience of integrating IT in the curriculum. It was important as it could encourage the school to play a more active role in disseminating best practices without too much disturbance or workload to be caused or increased for the teachers in the school.

Lastly, while appreciation was expressed on the level of resources given by the government, the school expressed a strong desire for professional advice/support drawn on some research-based developments addressing the specific needs of special schools under different categories for effective implementation of IT in the future. Moreover, sustaining technology’s use in response to the future rapid changes of society will be a test of the initiative’s success.

3.5.5 Case Report on School in the Mildly and Moderately Mentally Handicapped Category

3.5.5.1 School background

School history

The school was established in 1988 by a Buddhist organization. The school moved to new premises that were located in Fanling in December 2000. All the students were assessed and placed in the school by the Education Department. The students come from Tai Po and Northern District (Fanling and Sheung Shui).

There are 17 classes in the school, which includes 11 classes in the primary sector and another 6 in the secondary sector. There are 55.5 staff members in the school comprising the principal, 27 teachers, 4 resource teachers for the autistic children, 5 teaching assistants, and 18.5 non-teaching staff such as a speech therapist, technicians, social workers, a registered nurse, clerks, school drivers and 8 ancillary staff.

In the 2000-2001 school year, the school had an enrolment of 157 students, in which 95 students were in the primary sector and 62 students were in the secondary sector. The students were aged from 6 to 16. 58.6% of these 157 students had at least one other handicap. Of these students, there are 26.8% autistic students, 9.6 % are epileptic, 8.9% have Down's syndrome, 5.7% have Ventricular Septal defect, 2.5% suffer from hearing impairments, 2.5% are physically handicapped, and 2.5% are hyperactive.

The children's disabilities and learning needs

In order to understand more about the learning needs of the children in the school, their learning disabilities in regard to the degree of mental handicaps are described below:

Mild Grade (I.Q. 50-55 to approx.70)

According to the distinctive features described in the "Guide to Curriculum for Mentally Handicapped Children" (Curriculum Development Council, 2001), mildly mental handicapped children typically develop social and communication skills during the pre-school years (ages 0-5), have minimal impairment in sensori-motor areas, and often are not distinguishable from normal children until a later age. By their late teens, they are able to acquire academic skills up to approximately the sixth grade level, which is roughly equivalent to Primary 6 in Hong Kong.

Moderate Grade (I.Q. 35-40 to 50-55)

Moderately mentally handicapped children can talk or learn to communicate during the pre-school years. They may profit from vocational training and, with moderate supervision, can take care of themselves. They can profit from training in social and occupational skills, but are unlikely to progress beyond the second grade level in academic subjects (roughly equivalent to Primary 2 in Hong Kong). They may learn to travel independently to familiar places. During adolescence, their difficulties in recognizing social conventions may interfere with peer relationship.

Severe Grade (I.Q. 20-25 to 35-40)

During the pre-school period, the children of this group display poor motor development; they may learn to talk, and can be trained in elementary hygiene skills. They profit to only a limited extent from instruction in pre-academic subjects, such as familiarity with the alphabet and simple counting, but can master skills such as learning sight-reading of some "survival" words, such as "men" and "women" and "stop".

Besides, there is no doubt that a multiplicity of handicaps exists in this school and the majority of the children who have multiple handicaps are the autistic children. In this regard, the school has some additional staff, such as the resources teachers, the speech therapist and their teaching assistants to provide support. Besides these general lessons, they would also provide some individual or group lessons for these children who have obstacles (especially in speech).

Moreover, as these children generally have difficulties in learning and social adjustment, the curriculum is specially designed to equip them with self-care skills, independent living skills and communication skills; this is necessary in order that they can integrate into the community as contributing members. In addition to catering for a wide range of mentally handicapped children, the school required special attention in designing a curriculum in these areas for the children in the school.

The learning goals

Though the education of the whole person requires special schools to address problems that are more complicated than simply enhancing effects on the teaching and learning, it was set as one of the aims of the school. In the school plan (2000-2001), there are 4 aims related to children's learning and growth in the school:

1. To provide education to the children to enable them to attain whole-person development in the domains of ethics, intellect, physique, social skills and aesthetics with an emphasis on their multiple intellectual development;
2. To provide a learning environment in school, to develop in the children positive values and attitudes, to foster in the children self-confidence and a positive self-image, and to develop the spirit to live up and equip themselves;
3. To enable the children to achieve as much independence as possible with focus on enhancing children's communicative, and social and interpersonal development; and
4. To enable the children to be good citizens and become contributing members of the community.

There are other school goals such as implementing school-based administration and management, enhancing parents' communications and the professional development of staff, etc. One specific goal of the school is to encourage staff to be more concerned about the development of education, to actively participate the professional training in order to grasp more advanced education information and skills so as to enhance the quality of teaching.

3.5.5.2 IT implementation in the school

The school has been offering "Computer Studies" as one of the subjects since 1992. As stated by the principal, "it's the time when the government launched IT initiatives in a large-scale that we started to think about how IT could be implemented in the school in a more systematic way as one of the main goals of our yearly school plan."

The school IT team consisted of 6 core members, who were invited to be the team members according to their abilities and interests. There were no formal or systematic ways of collecting views from the staff in the school regarding IT implementation; most of the opinions or difficulties were sought informally by the IT team members. Very often, in decision-making about technology in the school, it was primarily the early adopters - who were often the enthusiastic teachers for the autistic children - who were engaged. It seemed that it might be a good strategy when the school was trying to introduce change at the initial stage. In order to cultivate the culture of using IT in teaching and learning, it was stressed that continuous communication amongst staff members regarding their specific concerns, especially on the specific needs of the children and the difficulties encountered during implementation, is necessary.

3.5.5.3 Different uses of technology in supporting teaching and learning

The teachers indicated that computer technology could provide a learning opportunity, especially for the children with autism who might not fully respond to typical teaching methods. These

children were able to gain a sense of empowerment when using a computer and they were allowed to exercise control and to act in a purposeful manner toward a desired learning goal. Therefore, the use of technology in supporting teaching and learning was first introduced by the group of teachers for the autistic children in the school.

As a tool for motivation

It is important to note that the children with autism often have difficulty with auditory stimuli, which is one of the major learning difficulties. Therefore, they require a visual stimulus to enhance or replace the auditory instruction prompt or auditory based material. It implied that the curriculum must be adapted for such specific needs, and computer-assisted instruction was found to be a motivating tool for these children, as the teachers believed that the children could benefit behaviorally from these kinds of technology-based curricular adaptations. Therefore, one teaching technique, which they named as the “visual strategy”, was widely accepted and adopted by the teachers in the school. As reflected by the teachers, the children showed more interest and became more motivated to learn during computer-assisted instruction. And the use of computer programs that created word-based prompts, using easy-to-use word and pictorial adaptations, would help achieving the learning targets of the lesson. It shows that educational software full of visual stimuli was necessary for supporting the children’s learning.

As a tool to reinforce the learning experience

Another characteristic regarding the learning of the autistic children is that they have communication difficulties. These children often demonstrate behavior that interferes with learning and participation in the home, school and community. There was a maximum of eight children in a class for autistic children in the school. These children usually experienced learning problems due to discrepancies between their performance levels and the way instruction was presented. Such classes were generally divided into three groups; they were taught by one teacher and one resource teacher. There were three locations in the classroom, which were named as “stations”. They include the main base, the self-study corner and the computer corner. A group of three children would learn at the main base where the “visual strategy” was adopted. Often the teacher would teach these children with the help of a computer, a projector and a screen. The learning targets would be achieved as technology was used to foster better behavior by maximizing the children’s attention span on the attractive symbols or word prompts.

In order to enhance the effectiveness of the above computer-based adaptations, a hands-on component was integrated for each child during the lesson. This could be achieved by incorporating an additional learning activity to reinforce the learning experience. In view of this, another two groups of children were arranged to engage in some custom computer programs and to do some pencil and paper tasks such as circling options at the “study corner”. Such arrangements could also minimize the disturbances that the children would make to other’s learning during the lesson, which would in turn enhance the children’s learning by increasing an individual child’s engagement and time on specific tasks during the lesson. Thus simply adapting the curriculum with visually based, hands-on teaching materials was the first important step in creating environments that foster positive behavior of the children and the achievement of the learning goals.

3.5.5.4 The implementation strategies

Infrastructure and school management and administration

In the 2000-2001 school plan, there were eight short-term goals of the IT Development Unit in the school. Four of these goals listed below were related to the school's infrastructure and school management and administration:

- To establish a sound network infrastructure in the school, and to ensure the provision level of hardware and software;
- To develop a school intranet in order to enhance the efficiency in coordinating the areas of school management, administration and teaching and learning;
- To establish a school library; and
- To use database to manage the children's academic report for each unit in stead of using word-processing.

As further stated by the principal, "Firstly, we have plans for setting up the network infrastructure. We know that all classrooms and some special rooms in the school will be linked up. Secondly, we need to use a database to manage our information ... then we will have our staff trained in BIT and IIT progressively ... Our school, like most of the other schools, closely follows the direction of the government."

Staff development

Another four of the school goals were related to the teaching and learning as well as the professional development of the teachers in the school. They include:

- To prepare to establish a system of management of the integrated resources for teaching and learning;
- To establish a database of internet resources of teaching and learning;
- To establish a support group for teaching and learning; and
- To organize school-based professional training so that all staff will be able to reach the "comfortable" level of IT competency, and to enhance the use of IT in various subjects.

There was a clear direction on the development of the school's infrastructure and the IT competencies of the staff, however it seemed that the teachers were not quite clear about the direction in implementing IT in teaching and learning. Much of the time was spent on the preparation and coordination work during the move to the new premises for the last few years, like ensuring the smooth running of the SAMS system and establishing the Local Area Network (LAN), etc.

Technical support

In rendering support to the school, the government provided an IT co-ordinator and 0.5 technical support staff for providing contract technical service. In view of the increasing demand on the technical service in school, the school employed an extra 0.5 technical support staff. Since the company could not assign one full-time staff for the school, the two technical staff were assigned for different time periods of the school hours, thus in some school hours there would be no technical support service to be provided. The teachers had a tendency to look for technical assistance from the ITC; this is considered as one of the ineffective use of manpower in the

school. Moreover, the school believed that a full-time member of the TSS was needed so that the ITC could concentrate on all the IT-related teaching and learning activities as well as its implementation.

3.5.5.5 Difficulties encountered and resources/support desired

One important aspect mentioned was the increasingly significant and numerous demands of teachers' work in the school. Beside implementing IT initiatives, the teachers are now being asked to assist with school management through various committee structures, to work and plan collaboratively for project work, participate in planning and delivering school-based staff development, communicate with parents more frequently, etc. All this seems have to be done within compressed time constraints in each academic year. It is hoped that the school can reduce the teaching hours for core members of the IT team so that more time could be spent on developing the school-based software and implementing the school-based IT plan.

3.5.5.6 Future needs and expectations

Much of the focus in the past two years was on hardware provision and networking. It was expressed that a computer for the teacher, a projector, a screen and at least two computers for children's use were the standard equipment in each classroom. It was crucial for teaching the children who needed to be taught in groups or group activities during the lesson. Such a setting was thought to be the pre-requisite for "bringing" IT into the classroom.

In fact, support for teachers means much more than having computers and a sound infrastructure in the school. As some teachers reflected, it was necessary to enhance teachers' professional development not only in technical skills, but also in specific models and supports related to curriculum areas of special schools. Thus, the one-size-fits-all training mode should be avoided and the obstacles to teachers' use of technology and related solutions should be identified through on-going research to inform professional development and planning.

Another aspect of the professional support desired in the school was technical staff to keep computers and networks running reliably. It was perceived as a necessary pre-condition for systemic integration into daily learning of the children in the school. Besides, in view of the trend that the use of technology in the school would be more intensive, the role of TSS would become more important in the future in the areas of the maintenance of the school's IT system as well as the upgrading the level of IT provision. All of these concerns deserve serious attention of the government for future planning.

3.5.6 Case Report on School in the Physically Handicapped Category

3.5.6.1 School background

School history

The school was established in 1967 by a voluntary organization. The school was a government aided school for the physically handicapped children. All the students were assessed and placed in the school by the Education Department. The students come from Hong Kong Island and New Territories.

The school offers a general education in special day or residential school setting according to the children's needs. There are 77.5 staff members in the school consisting of the principal, 24 teachers, 8 teaching assistants, and 47 non-teaching staff such as 1 speech therapist (ST), 4.5 physiotherapists (PTs), 2 assistants for the PTs, 4.5 occupational therapists (OTs), 4.5 assistants for the OTs, 1 educational psychologist, 1 laboratory technician, 2 social workers, 2 nurses, 2 clerks, 3 school drivers and 17 ancillary staff. In addition to the above, there are also 44 staff members in the school residence.

In the 2000-2001 school year, the school had an enrolment of 136 students, in which 67 students (49.3%) were residential students. There were 14 classes in the school, which includes 7 classes in the primary sector and another 7 in the secondary sector. There are 73 students (53.7%) with cerebral palsy. Other students had other diseases such as muscular dystrophy, spinal neuronal dystrophy, orthopedic disease and spinal disease.

The children's disabilities and learning needs

In order to understand more about the learning needs of the children in the school, the effects of physical problems on their education are described below:

Mobility and Physical Fitness

The physically handicapped children may have various degrees of weaknesses and in co-ordination of the limbs that may affect mobility, posture and manual dexterity. Other physical problems such as heart diseases may cause poor exercise tolerance and low levels of physical fitness. All these may directly result in the children's difficulty to cope with ordinary school routine and limit their ability in exploring and understanding the environment.

Perception and Concentration

In addition to the motor problems, neurological impairment may also cause sensory deficiency or over stimulation that may disturb perception and concentration inducing specific learning difficulties for the children.

Intelligence

One associated disability among the physically handicapped children - cerebral palsied children in particular - is mental handicaps.

Communication

Cerebral palsy and the late stage of muscular dystrophy may affect the children's ability in verbal communication. On top of this, their non-verbal communication may also be affected because these conditions may limit their facial expression and ability in signing.

Emotion

These problems that the physically handicapped children have may cause them to have some emotional problems including low self-esteem, lack of self-confidence, fear of changes in environment, apathy, over dependence on others, low level of aspiration, anxiety and frustration. Some children who have their brain damaged may also be hyperactive, aggressive or have a lack of emotional control.

The children in the school had various kinds of obstacles in learning. Most of the children (73.5%) needed assistive equipment to help the mobility in their daily life activities. Some children also had other obstacles such as visual impairment or hearing impairment (27.9%), difficulties in writing (26.5%), mental handicap (13.2%), non-verbal communication (9.6%) and other obstacles (7.4%). Based on the above possible effects of physical handicaps on the children, the curriculum needs to be designed to help them overcome their physical handicaps and the associated learning difficulties. In fact, 58.1% of the children in the school had at least one handicap and 41.9% had more than one handicap.

There are variations in duration or severity among the physically handicapped children. In other words, the handicapping conditions of the children may be temporary or permanent and mild or severe. The range of abilities of the children in the school was very great. The brighter children were learning the mainstream curriculum and sat for the Hong Kong Certificate of Education Examination, or learning a more practical curriculum preparing for vocational training. However, over half of the children were affected by various degrees of perceptual-motor or mental limitations besides difficulties in movements. Therefore, it is necessary to take into consideration their individual differences in mental and physical capacities, emotional states, learning attitudes, daily living skills, social competency, studies and career development after leaving school when planning curriculum and implementation strategies for them.

In addition to the above individual differences of the learning ability of the children, there is no doubt that a multiplicity of handicaps exists in this school. In this regard, the school has a strong team of paramedical staff, such as the speech therapist, physiotherapists, occupational therapists, and educational psychologist, etc. working in close collaboration with teachers in the school. Such a working pattern is necessary to cater for the children's physical and mental health conditions and is a major factor in achieving the learning goals.

The school goals

According the school mission statements, the school aims at providing education and rehabilitation training to students so that they can reach their full potential, enjoy life with others in community and become independent citizens who can contribute to the society. The main focus is to lead students to:

1. face and accept their physical disabilities;
2. recognize their strength; and

3. appreciate the positive value of life.

In the school IT plan (2000-2001), it was stated that there were four dimensions of long term goals regarding the needs of students, staff, the school and community:

Student dimension

It was envisioned that the information technology could-

- broaden students' learning scope;
- enhance students' learning motivation and interactive learning;
- develop students' IT competency; and
- develop students' life-long learning ability.

Staff dimension

It was envisioned that the teachers could-

- enhance the quality of teaching and learning activities through using a variety of IT resources; and
- develop the staff's professional knowledge and skills through the IT training courses/activities.

School dimension

It was envisioned that the school could-

- develop a culture of using and sharing IT and implement curriculum reform;
- establish a favorable environment for effective communication among staff of various departments; and
- improve the management and sharing of resources.

Community dimension

It was envisioned that the Internet and the school homepage could-

- support teaching and sharing of experiences;
- encourage communication between staff and parents; and
- arouse public concern to the abilities and the special needs of the students.

3.5.6.2 Stages of implementation

Since 1980, some children who, usually because of cerebral palsy involvement, would not adequately develop the fine motor skills to be able to effectively use a pencil and paper, used computers as a compensatory tool for writing at the initial stage. Meanwhile the school started offering "Computer Studies" as one of the subjects aimed at teaching some computer concepts such as programming. Other skills such as computer graphics, PageMaker skills and Chinese input skills were also taught in the school. Since the children in the school were physically handicapped, in addition to choosing appropriate software that might contribute to the child's development, the teachers were required to design and produce many assistive physical/input devices necessary to facilitate the child's learning with computers. Thus a lot of such devices were made by the teachers during the 80's. Besides using computers in teaching and learning, another focus in the school during the 80's was using technology for rehabilitation work for the children. These two dimensions of using technology made great developments during the 90's.

Before 1997, learning computing skills was treated as a kind of “life application” that would prepare the children to integrate into ordinary environments regarding their future employment; in fact the understanding on the use of IT in education have been changing in the past six years in the school. The school realized the need and importance for the educational practitioners to have the ‘paradigm shift’ due to the exponential growth in the use of communication and information technology in recent years. As the principal stated, “People are now talking about ‘IT’, not ‘computers’ anymore.” Having recognized that the children’s learning was best facilitated through an active interaction and exploration of their environment, the teachers offered the opportunity to the children to learn with software in order to expand their learning through interaction, exploration, discovery, and problem-solving. The learning content and targets would be set according to the children’s interests such as elements like computer graphics and webpage design, etc. Thus the children’s genuine interests and life skills that will be required for their future development is a key factor which can influence the implementation and development of IT in the school.

3.5.6.3 Different uses of technology in supporting teaching and learning

As a tool for enhancing cognitive development

The teachers indicated that computer technology could provide learning opportunities, especially for the more advanced children who might not be fully developed under the traditional teaching methods. It also allowed opportunities for repetition and practice in a variety of activities and settings to reinforce what they had learnt in the classroom. Moreover, these children were able to gain a sense of empowerment when using a computer and they were allowed to exercise control and to act in a purposeful manner toward a desired learning goal. These children could interact with computers to learn some rather complicated concepts or computing skills such as word processing, spreadsheets, graphing-charting skills, etc. The teachers might design practice activities requiring a high level of knowledge, including analysis, synthesis, and evaluation, which were different from knowing about something and teaching it to someone else. Thus assistive technologies such as input or output devices and special adaptations of the software were necessary to help these children overcome their physical limitations in order to achieve the desired cognitive development.

As a tool for enhancing the communication abilities and social skills

As stated in the school documents in 2000/2001 school year, only 13.2% of the children intake in the school were mentally handicapped. Though multiplicity of handicaps still exists in this school, the main obstacle in the children had various degrees of weaknesses and lack of co-ordination of the limbs that might affect their mobility, posture and manual dexterity. These would limit their ability in exploring and understanding the environment, and the opportunity to interact with others in their daily life. In other words, they had limitations in playing and exploring, which is the primary way young children learn. For these children, the school provided free access to the computer room during the recess time and after-school hours in order to encourage the children have more interactions with peers. It provided opportunities for the children to have spontaneous interactions, develop turn-taking skills, initiate wants/needs, be a good listener, show interest in others and develop simple problem solving skills while engaged in facilitated computer activities. In addition to teaching academic skills, the use of computer technology in the school was to help the children to develop the effective communication skills along with the basic social skills that were necessary for interaction with peers in the future.

As a tool for bridging the gap with the society

One significant role of the computer technology was to compensate their handicaps and help to extend their reach to the outside world. As stated by one of the children, “With access to the Internet, we could become aware of the services offered to us in society such as workshops for computing skills, and how to use those services.” The children believed that the Internet provided information about the availability of community support/services or activities in the society that were necessary to them. Thus IT could help them develop to be independent and more importantly to bridge the gap for them to be as productive as other members of the society in the future.

3.5.6.4 The implementation strategies

The school had a comprehensive plan in IT implementation in 2000-2001 and there were short-term goals regarding the eight dimensions as below. They include teaching and learning, curriculum, therapy, student development, staff training, whole-school interaction, resource management, and enhancement for teachers:

IT and Teaching and Learning

- to establish multi-media rooms to increase the effectiveness of teaching and learning; provide support and encourage the staff to use IT in teaching and learning.

IT and Curriculum

- to plan the curriculum of computer literacy/studies for the primary and secondary sectors, to set the learning targets of IT for the students at various stages, and to integrate the IT elements into each subject.

IT and Therapy

- to collaborate closely with the team of professionals from different disciplines in the school in order to provide the children who have difficulties in communication and writing with sufficient IT facilities to enhance their learning and communication abilities.

IT and Student Development

- to develop in the children the proper attitudes towards use of IT and encourage them to equip themselves with the necessary IT skills besides learning with the ordinary curriculum so as to develop their potential, autonomy to create, and life-long self learning ability.

IT and Staff Training

- to provide training to all teaching staff in using different kinds of IT, to promote a culture of full utilization of IT, and to develop various modes of training for the teaching staff of various units and the parents.

IT and Whole-School Interaction

- to develop the school Intranet and infrastructure for accessing Internet to support information sharing and encourage communication between teachers, students and parents.

IT and Resource Management

- to manage the IT resources properly, to ensure the smooth operation of all facilities, and establish a user-friendly and healthy environment.

Enhancement for Teachers

- to employ an additional technical support staff by the government's enhancement grant so as to enhance the use of IT in teaching and learning and catering for the individual needs of the children by the teachers.

Infrastructure

There are around a total of 100 computers in the school. About 45 computers were for staff use. All the classrooms are linked up and have access to the Internet. Three network platforms are established including the Local Area Network (LAN), the school Intranet and the school homepage. In order to establish a better network infrastructure to support information sharing and to encourage communication amongst staff of various units, the number of network nodes was extended and staff members were encouraged to use the settings of various platforms to support teaching and learning.

Besides, a software database for IT in education was established in the school library and such of which borrowing services had been provided to the teachers and students. There would be regular updating and acquiring of related software of various subjects. The staff members were encouraged to use the resources such as the software database and virtual CD in supporting teaching and learning in various subjects. And a multi-media room that is funded by the QEF is being constructed for enhancing the use of "Bi-literacy and Tri-lingualism" and multi-media approach in teaching and learning. All the above arrangements were made in line with one of the specific goals in 2000-2001 school year: to ensure the proper use of the IT resources, the smooth operation of all facilities, and establish a user-friendly and healthy environment.

Curriculum

The school formulated the curriculum content of IT and computer literacy for the primary and secondary sectors and set the learning targets for the students at various stages. Another focus would be the suggestions on the elements in which IT could be adopted in related teaching in the eight key learning areas. As stated by the ITC, "We are planning to integrate the IT team into the curriculum units that would consist of eight teams next year so as to have full IT implementation in teaching and learning regarding the eight learning areas. Each team leader will be given some flexibility to decide what IT elements should be included in the related subjects." Due to the experience of the original IT team members, it was hoped that their integration into the curriculum unit would enhance the effectiveness of the IT implementation.

Staff development

Most of the children had experience in using IT in supporting their learning and all teachers completed the training course for the "basic" level of IT competency (BIT). The school aimed at assisting all teachers to complete the "Portfolio" of the BIT course and would provide training of the "comfortable" level (IIT) progressively. Another goal was to evaluate and modify the mode of training of the staff of various units and parents by adopting the concept of "train the trainer".

There was a clear direction on the development of the school's infrastructure and the IT competencies of the staff. As the stated by the ITC, "The development of using IT in teaching

and learning in various subjects within the eight learning areas will be one of our major tasks in the next year.” More and more teachers were willing to use PowerPoint as a demonstration tool or to use Authorware to make teaching materials. The need of the teachers at present was to have a deeper understanding on the way of using IT to enhance the children’s teaching and learning and the corresponding need of changing the mode of teaching in the particular context of the school.

Technical support

There were six team members in the school IT team. One member was the computer subject panel who was in charge of the whole school’s IT development, resource planning and allocation. One member was the IT co-ordinator who managed the maintenance of the hardware, the school’s IT system and Intranet, and acquired materials and took charge of the ED3 project. There was also one member who planned, coordinated and followed up all the IT training and development activities of the staff and parents. And another was responsible for the technical development of students – he would organize some multi-media classes during school hours or summer workshops in summer time. There was also one member who developed software for teaching and learning and another one who planned the therapy services for those students that needed assistive technology to learn.

It was noted that the IT team that consisted only of three staff members and was originated from the resource unit which was not a formal unit in the school. However, it was established according to the guideline of the government two years ago. More and more members were invited to join the team progressively and a new member from the school residence would be included next year. Thus the structure of the school IT team kept expanding and changing according to the needs of the school during the implementation.

3.5.6.5 Difficulties encountered and resources/support desired

These children could only access the computers independently with the help of assistive technologies in most cases. Thus, changes and accommodations were needed. For example, for those who could not use ordinary input devices such as the keyboard and mouse, a keyguard would be used to make it easier to press the keys accurately. Other assistive technology such as touch screens was necessary for some of the children who had difficulties in using the ordinary mouse. This kind of equipment was important in using IT in therapy for the children but they were expensive in most cases. It was hoped that the government could draw attention to the extra-funding/support that would cater for the specific needs of the school.

In rendering support to the school, the government provided an IT coordinator and a technical support staff for providing contract technical service. In view of the increasing demand on the technical service in school, the school employed an extra one technical support staff by the additional enhancement grant from the government. The school believed that a full-time ITC and a TSS who were employed under a permanent post was needed so that they could be involved in the long-term IT implementation.

In order to implement IT in teaching and learning, the teachers need to spend more time in searching relevant information for adapting the existing curriculum and designing activities to meet the individual needs of the children. Due to the increasingly significant and numerous

demands of teacher's work in the school, it may lower the teachers' motivation and interest in teaching with IT. It seems that it would have to be addressed by the government for future development.

3.5.6.6 Future needs and expectations

The government focus on the hardware provision and networking in the past two years was the initial stage. It is more important at present to have a screen in each classroom. The teachers can access the Internet only by bringing along a mobile projector and a notebook into the classroom. Such mode is thought to be an effective way of equipping the classroom with Internet access. In fact, support for teachers means much more than having computers and a sound infrastructure in the school. As reflected by the ITC, it was more important to enhance teachers' professional development not only in technical skills, but also in the changing models and supports related to curriculum areas of special schools. There are discrepancies existing amongst staff in terms of their readiness of using IT in teaching and learning. A certain number of teachers are still using the traditional pedagogical practices; time is needed for changing their practices. Thus the one-size-fits-all training mode should be avoided and the obstacles to teachers' use of technology and related solutions should be identified through on-going research to inform professional development and planning.

Similar to the previous findings of other categories of special school, another aspect of the professional support desired in the school was the technical people to keep computers and networks running reliably. It was perceived as a necessary pre-condition for systemic integration into daily learning of the children in the school and the role of TSS would become more important in the future in the areas of the maintenance of the school's IT system as well as the upgrading of the level of IT provisions due to the increasing intensity of the use of technology in the school. Again, all of these concerns deserve serious attention of the government for future planning.

Children with disabilities will want to lead as normal a life as possible and to contribute to society as much as they can. Most of the teachers and children in this school have a desire that more resources/support for the rehabilitation service was needed to acknowledge the equal rights of the children with disabilities to be full members of the community. The physically handicapped children will be particularly vulnerable to adjustment problems as they come to recognize their limitations, particularly in contrast to their peers. It is necessary to develop their physical, mental and social capabilities to the fullest possible extent so as to promote their integration into the community and ensure that there will be no lost ground in future years because of their handicaps. Again, these children can be closely informed of other services provided by the school residential facilities and specialist units from the community by the use of technology. It requires the government's attention on the time and resources to provide this focus on the community.

3.5.7 Summary of Findings

The above case study schools have been adopting information technology in teaching for years, mainly as part of computer-related courses. In addition, they have been using information technology to support the teaching of other subjects. However, how this is deployed depends

upon the specific situation of each school. In fact, the case studies highlight the “special” aspect of special schools in terms of the different characteristics of each school as well as the individual needs of the children within each establishment. Further, the issue of use of IT in special education must be considered in conjunction with the deployment of IT as and with assistive technologies. However, as reflected in the case studies, this latter aspect of using IT in special education has not been really catered for in terms of the support given by the government to special schools in supporting their use of IT in teaching and learning. The provision made for special schools was still very much the same as those provided for the mainstream schools.

All of the schools have been developing their IT infrastructure adaptations for the specific needs of their children. In the case of the schools for mentally handicapped children, it is interesting to compare the two cases. The school for the mildly and moderately handicapped children was at a more elementary stage of integrating IT into their teaching and learning activities, partly due to their move into a new campus. The IT coordinator of this school said that “the development of using IT in teaching and learning seems to be slowing down these days; however, its implementation in various subjects would be one of the major tasks in the following year.” This school has been adapting and developing its own software and materials for teaching using IT. IT was used mainly as a tool for demonstration and reinforcement – which is a characteristic of the early stages of adoption. The emphasis at this point was in the development of demonstration materials using PowerPoint or Authorware, and the pedagogical approach is based on the “visual strategy”, which is one that is widely adopted and accepted by the teachers in this school. This approach focused mainly on the use of programs that used easy-to-use word and pictorial adaptations to provide visual stimuli. In this school, the teaching of the autistic children, whose teachers were often the early enthusiasts in using IT, often involved the use of IT as a tool for attracting students’ attention and providing hands on work. In the main, this school was still using an expository approach to teaching, and there was no real changes in teaching paradigm. The main pedagogical approach used was an extension of the visual strategy.

In comparison, in the school for the severely mentally handicapped children, more uses of IT as a tool for enhancing cognitive development was made, such that for the comparatively more advanced students, they could interact with computers to learn about basic concepts, such as colour and shape. The school has a strong leadership in the area of IT integration, who placed great importance on the flexibility and adaptability of the implementations. In particular, to cope with the fact that the children are severely mentally handicapped and hence would not be able to handle even software designed for very young children, they have adapted such software by breaking them down into a number of concrete learning targets such that they can be tailored according to each child’s specific needs. Therefore, each child can learn at his/her own pace. It should be noted, however, that in both schools emphasis was placed upon the provision of visual stimuli for the children.

Another difference between the two schools is the leadership that had been exercised in the implementation of IT. Whilst in the school for the mildly handicapped, the initiatives were controlled by the IT team, with no formal approach being used for acquiring feedback from the teachers, and the early adopters (often the teachers for the autistic children) were those who influenced the decisions involved in IT implementation. In contrast, in the school for the severely handicapped, a more systematic approach was taken. An initial needs analysis for a small group of children and the coordinated collection of feedback from staff was made before a draft proposal was prepared by the principal and the IT coordinator for fund-raising. A formal

academic support group was set up as well for the teachers to raise their problems and request support. It should be noted that resources were only provided upon the request of the teachers based on students' needs. There has also been an IT training plan for staff for years, which makes use of the training available from both in-house and external sources.

Due to the diversity of disabilities that the children had, the school for the physically handicapped placed great emphasis on the need to make adaptations in terms of hardware. It must be noted that this school was an early adopter of IT, having used computers as a compensatory tool for children who cannot use pencils since 1980 (usually because of cerebral palsy). It has had a history of teachers developing such devices since the 1980s. It must be noted that, as the children are of normal intelligence, much of the resources and support for IT are needed to provide more equitable access to these children so that they may lead as normal a life as possible and to contribute to society as much as they can. Through the use of IT, the children can be informed of other services provided by the school residential facilities and other specialist units in the community. It was considered necessary to develop their physical, mental and social capabilities to the fullest possible extent in order to promote their integration into the community and ensure that there will be no lost ground in future years due to their handicaps. Since 1997, computing has been integrated into the teaching of other subjects rather than being taught as a separate life skill. This curriculum change was a result of the change in the school's perception of the role of computers: *"people are now talking about 'IT', not 'computers' anymore."*

In examining the survey descriptives for special schools, there is generally no apparent difference between special schools and the mainstream schools, though the profile appear to be closer to primary schools than the secondary schools. One distinct difference, however, was in the IT competence reported by teachers and students. Whilst for mainstream schools the students' IT competence is in general on par or better than that of the teachers, for special schools, the teachers' competence is much greater than that of the students. Thus more specific support needs to be made to enable the children in special schools to be better able to develop their IT skills. Apparently, the kind of conditions that would enable children in mainstream schools to learn IT such as the provision of more computers and training teachers with better IT skills are insufficient by themselves to help children with special needs to bridge the digital divide.

While the case reports show that special schools have been following different approaches in their usage of IT in education and great efforts were made in some instances to allow the children to interact with computers, the survey statistics show that teachers were predominantly using the expository approach in their adoption of IT in teaching and learning. Indeed, from their responses to Q. 17 on the teacher questionnaire, a teacher-centred expository approach was the most frequently used one, as similar to those given by mainstream schoolteachers. One big difference, though, is that teachers in special schools are generally very keen to make adaptations of hardware and software for their students according to their needs. Also, the level of IT usage is higher in special schools and there is a greater emphasis on catering for individual needs. In particular, a full-time member of TSS was felt to be much needed in order to free the IT coordinator of duties related to take up development and adaptation work, instead of providing technical support. A part-time member was found to be insufficient to take over this role.