Chapter 2

Review of Literature

2.0 Introduction

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The purpose of the literature review is to identify and justify various variables that can be measured in identifying the level of information and communication technology usage in the secondary schools.

The information was searched from various educational and non educational journals, reports; write ups by local academicians on this issue and also from the Internet resources. Some of the resources used were European Journal of Open and Distance Learning, International Electronic Journal For Leadership in Learning, Education Leadership, Journal of Research On Computing in Education and Computer Bulletin. The Internet resources were searched using key words such as "ICT" and "schools". The criteria take into account for searching and accessing the resources were firstly, being educational oriented media and also cover widely on technology implementation in schools.

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2.1 *Background*

Malaysia implemented the first computer system in 1966. Since then, the Government has introduced various initiatives to facilitate the greater adoption and diffusion of ICT to improve capacities in every field of business, industry, education and life in general. These measures include the enhancement of education and training programmes, provision of an environment conducive to the development of ICT, provision of incentives for computerisation and automation, and the creation of venture capital funds. Currently, Malaysia is making every effort to steer the economy towards a knowledge-based one. In July 2001, the Deputy Prime Minister announced that Malaysia's K-Economy Master Plan was in the final stages of formulation (Chan, 2002).

Malaysia also has a long-term vision, usually referred to as "Vision 2020", which calls for sustained, productivity-driven growth, which will be achievable only with a technologically literate, critically thinking workforce prepared to participate fully in the global economy of the 21st century. At the same time, Malaysia's National Philosophy of Education calls for "developing the potential of individuals in a holistic and integrated manner, so as to produce individuals who are intellectually, spiritually, emotionally and physically balanced and harmonious" (Chan, 2002).

In order to support the country's ICT master plan and in line with the country's drive to fulfil Vision 2020, the education system has to be transformed. The catalyst for this transformation will be ICT-enabled Smart Schools. In addition to the Smart School

project, the Ministry of Education is also attempting to reduce the digital divide that exists in the different parts of the country by providing computer laboratories to thousands of schools. Other ICT-related projects involve the training of teachers, school administrators and other school staff. Innovative projects like the use of electronic books and e-learning are also being piloted to ensure their feasibility before any roll-out to all the schools in the country. Non-governmental agencies are also very much involved in the drive to introduce ICT into schools (Ministry of Education, 1997).

2.2 *Information and Communication Technology*

Information and communication technology (ICT) permeates the business environment and underpins the success of modern corporations as well as provide government with cost efficient civil service systems. At the same time, the tools and techniques of ICT are of value added in the process of teaching, learning and managing of learning institutions. The real use of ICT cuts across all aspects of economical and social life. Technological development in communication is very rapid and technological knowledge quickly becomes obsolete and new technology has to be mastered. Smooth adaptation is only possible when understanding of ICT is based on invariant, stable concepts (Leighfield, 1997).

2.3 *Approaches to ICT Development in Schools*

The Ministry of Education sees ICT as a means, not an end in itself. As such, all efforts are concentrated on developing new media as tools in the service of richer curricula,

enhanced pedagogies, more effective organisational structures in schools, stronger links between schools and society, and the empowerment of disenfranchised learners. The Ministry believes that properly designed and implemented computing and communications have the potential to revolutionise education and improve learning as profoundly as information technology has transformed medicine, finance, manufacturing and numerous other sectors of society.

Technology is not seen as a "vitamin" whose mere presence in schools can catalyse better educational outcomes or simply another subject in the curriculum, suited primarily for teaching students to use tools they may encounter as adults. But the concept of ICT in education, as seen by the Ministry of Education, includes systems that enable information gathering, management, manipulation, access, and communication in various forms. The Ministry has formulated three main policies for ICT in education (Ministry of Education, 1997).

The **first policy** is that of ICT for all students, meaning that ICT is used as an enabler to reduce the digital gap between the schools. The **second policy** emphasises the role and function of ICT in education as a teaching and learning tool, as part of a subject, and as a subject by itself. Apart from radio and television as a teaching and learning tool, this policy stresses the use of the computer for accessing information, communication, and as a productivity tool. ICT as part of a subject refers to the use of software (e.g. AutoCAD and SCAD) in subjects such as "Invention" and "Engineering Drawing." ICT as a subject

refers to the introduction of subjects such as "Information Technology" and "Computerisation". The **third policy** emphasises using ICT to increase productivity, efficiency and effectiveness of the management system. ICT will be extensively used to automate and mechanise work processes such as the processing of official forms, timetable generation, management of information systems, lesson planning, financial management and the maintenance of inventories (Chan, 2002).

Looking for similarity in diversity in earlier experience with the introduction of ICT in curricula, one can identify four specific approaches to ICT in education. These approaches are related to the situation in a particular school across all area related to the growth of ICT in their system. The four approaches are emerging, applying, integrating and transforming (Kendall, 2001).

The emerging approach is linked with schools in the beginning stage of ICT development. The schools begin to purchase or have had some equipment and software donated. In this initial phase, administrators and teachers are just starting to explore the possibilities and consequences of adding ICT for school management and the curriculum. The schools are still firmly grounded in traditional, teacher centred practice. The curriculum that increases the basic skills and awareness of the uses of ICT assists movement to the next phase.

The applying approach is linked with a school in which new understanding of the contribution of ICT to learning has developed. In this phase, administrators and teachers

use ICT for task already carried out in schools, and teachers largely dominate the learning environment. In order to move to the next phase, the school chooses a curriculum that increases the use of ICT in various subject areas with specific tools and software.

The next approach, integration is linked with the school that now has a range of technologies both in labs, classrooms and administrative offices. The school staff explores new ways in which ICT changes their personal productivity and professional practice. The curriculum begins to merge subject areas to reflect the real world application.

Finally the transforming approach is linked with the school that has used ICT creatively to rethink and renew school organisation. At this stage ICT has become an integral but invisible part of the daily personal productivity and professional practice. The focus of curriculum is now learner-centered and integrates subject area in real world application. The school will become a centre of learning for community.

2.4 Purpose of ICT in Schools

The purpose of ICT in schools, other than the normal knowledge transfer process, is to transfer the technological skill. The technology curriculum aims at developing the "technological literacy" of students (Abbott, 1997). This involves an understanding of three major aspects or strands of the technology curriculum. These are:

a) technological knowledge and understanding ,

b) technological capacity and

c) understanding and awareness of the relationship between technology and society

Within the technological knowledge and understanding strand, students:

a) learn how technologies are used and how they operate,

b) learn about technological principles and systems,

c) learn how technologists work, and

d) learn how technological ideas and outcomes are presented, promoted, and evaluated.

Within the technological capability strand, students identify needs and opportunities for technological development and develop technological products. With reference to the needs and opportunities, students:

a) develop appropriate solutions,

b) manage time and other resources to produce technological outcomes,

c) present and promote their ideas, strategies, and outcomes and

d) evaluate their approaches and outcomes and those of others.

Within the technology and society strand, students learn about the interactions between technology and people's beliefs and values, and study the impact of technology on people's lives and on the environment. The technology curriculum also identifies eight key technological areas within which these strands can be developed (Shield, 2000). These are:

a) biotechnology

b) electronics and control technology

c) food technology

d) information and communication technology

e) materials technology

f) production and process technology

g) structures and mechanisms.

h) heavy industry technology

During the time that students are at schools, they should experience a wide range of these technological areas. For example, between Forms 1 and 3, students should experience technological knowledge and understanding different technologies. In Forms 4 and 5, students are expected to experience technological capability and develop products.

2.5 What is Smart School?

A Smart School incorporates ideas that benefit not only our schools but provide real life experience to students. Instead of heavy schoolbags, Malaysian students will be toting laptops to classes in the 21st century. According to former Minister of Education Datuk Seri Najib Tun Razak, the Smart School concept would give students access to unlimited information from their laptops. Examinations would be held using computers and pupils who fall ill could follow lessons from home on their laptops. This initiative plan has been included in the Seventh Malaysia Plan. By the end of the plan, the Ministry hopes to set up computer laboratories for schools with an enrolment of 750 or more (Ministry of Education, 1997).

The Malaysian Smart School was launched in July 1997 by the Prime Minister as one of the Multimedia Super Corridor's Flagship Applications. The aim was to capitalise on leading-edge technologies and the rapid deployment of the MSC's infrastructure to jumpstart deployment of enabling technology to schools. This was done by creating a group of about ninety pilot schools in 1999 that will serve as the nucleus for the eventual nationwide roll-out of Smart School concepts, materials, skills and technologies.

The aim of these Smart Schools is to help the country achieve the aims of the National Philosophy of Education, as well as to foster the development of a workforce prepared to meet the challenges of the 21st century. Transforming the educational system entails changing the culture and practices of Malaysia's primary and secondary schools, moving away from memory-based learning designed for the average student, to an education that stimulates thinking, creativity and caring, caters to individual differences and learning styles, and are based on more equitable access (Chan, 2002).

At the classroom level, besides textbooks, teaching and learning materials, there will be the inclusion of multimedia courseware and software such as CD-ROMs with elements of sound, graphics and animation etc. The system will be interactive, three-dimensional and exhibit virtual reality (Allegra, 1999).

The Smart School administrative center will have a computer system which contains a database of all teachers and students. This in turn will be connected to the local district

education office through the wide area network or the link of a network of computers over an unlimited geographical area. The library will now be a centre that supplies multimedia courseware and network resources like access to the Internet. The teachers' rooms will now contain on-line access to courseware catalogs and databases which they can make use of to tailor-make courses to suit the needs of their students (Allegra, 1999). The end result is to produce a workforce of computer literates that is ready to meet the challenges of the next century and will help turn the country into developed nation status. That is why the Smart School is one of the seven flagships of the Multimedia Super Corridor. At the pilot stage, only 90 schools have been selected by the Government to carry out the implementation plan. By 2010, the Ministry hopes that all 10,000 primary and secondary schools will be Smart Schools (Ministry of Education, 1997).

In year 2000 only 90 schools will get to enjoy the Smart School concept due to the heavy cost involved, the Ministry has asked other schools to try and source funds on their own. Corporate companies are encouraged to help fund schools that can assist them in becoming a Smart School. For instance, the Chinese Smart Schools project, which involved the injecting of fund to 114 Chinese schools by MCA (Malaysian Chinese Association). This project is directly related to the efforts of one of the political partners in the country's ruling coalition party. The project aims to set up computer laboratories in more than 100 selected Chinese stream primary schools throughout the country, for the purpose of ensuring ICT literacy of school staff and students. The project also involves the use of selected courseware for classroom pedagogy.

At the Smart Schools, there will be a Media/Technology Coordinator to help deploy multimedia and other technologies in the Smart School. The coordinator must be IT proficient and able to assist the principal in managing software applications and in liaising with technical support staff for the maintenance and upgrading of IT facilities. By the end of 1999, 3,800 teachers have been trained on the Smart School concept whereas Ministry officers will help in planning, coordinating, monitoring and evaluating the programme (Ministry of Education, 1997).

Other related projects initiated in parallel with the Smart Schools concepts are the preparation of ICT resources. In 2001, the Ministry initiated a pilot project involving the use of the electronic book or e-book. The Ministry was interested to see how this device which stores electronic textbooks and links the user to the internet can be used to improve teaching and learning in the classroom. The Ministry was also interested to investigate the use of the e-book to replace conventional textbooks and thereby resolve the perennial problem of heavy school-bags. The pilot project was conducted in 35 schools over a period of five months. The company involved in the pilot project supplied 2491 e-books to the schools. More than 400 teachers and about 2000 students were involved in the project. Initial findings indicate that the device does improve computer and technology knowledge, as well as engage students in reading and learning (Chan, 2002).

Individual states are also building their own momentum towards implementing ICT in education. An example of a state-initiated project is the Penang E-Learning Community

Project, spearheaded by the Penang State Government. This project was started in 1997 and is mainly managed by the Science University of Malaysia in Penang. The project involves the creation of Web presence, Web tools that promote collaboration and web-based services to the community to obtain sought-after information. Components of services delivered include e-mail, web hosting, electronic discussion and the creation of searchable databases. Project milestones include compilation of current content to be migrated to the E-Learning Website, which is being developed to host homepages for at least 100 schools in the state. No equipping of hardware and software is involved.

According to a report dated September 2001, some 300 teachers from 157 schools (about 50% of the schools in the state) had been trained in web page development. Some 100 schools had uploaded their web pages already, with another 29 waiting to do so.

2.6 Governments policies on ICT in Education

The new economy will lead to increased productivity, higher income as well as a better quality of life. Survival in a borderless global economy based on knowledge requires everyone to be equipped with new skills and assimilate the culture of high technology and dynamic entrepreneurship. This is not wishful thinking. In fact, the Government has painstakingly endeavored to build a strong foundation, in particular through education and human resource development. There is definitely someone in every village who has acquired skills and knowledge in the field of technology from an institution of higher learning which was not possible eight or ten years ago (Chan,2000).

Skills and entrepreneurship will drive the new economy. In future, GDP growth will be spearheaded by knowledge-based industries in all sectors, particularly the manufacturing and services sectors. Therefore, intensifying investment in ICT, education and the retraining of workers is an investment for the further. The need of knowledge workers to constantly upgrade their skills and efficiency is important in K-economy. Human resource development will remain a national priority. This means a culture of life-long learning that does not cease on graduation or job promotion. This is the main ingredient of prosperity. In fact, the nation has many intelligent and bright people who have reaped benefits from these changes. Some of them have not only worked for large domestic companies, but also multinationals at home and abroad.

The nation's aspiration of creating a knowledge society must begin with the school children. The computer literacy programme started in the 1980s with a pilot program and encouragement of computer clubs in schools. The Smart Schools program had been implemented with the first phase of this pioneer project involving 90 schools which should have been completed by the year 2002. The success of this pioneer project will provide the basis for the extension of this programme nationwide. The Government is also implementing the computer laboratory programme, whereby each school will be provided with between 20 to 40 computers and equipped with multimedia and internet facilities. Priority will be given to rural schools and a start, work to construct 2,200 computer laboratories has begun throughout the nation. By the end of year 2001, all schools with electricity supply and telephones are expected to be equipped with computers and software through this programme. This measure is undertaken to produce

more computer literate students who have initiative and are intelligent, creative and independent. It is assumed that students will also take the opportunity to learn the English language as it is the main language of the ICT world. The fact that English has been made medium to teach Mathematics and Science in schools are in line with the government policy in ICT implementation (Chan, 2002).

The first major national initiative was based on an assumption that the greatest success would come by providing resources into schools. Thus there was a programme to support schools and the public in purchasing computers so that all schools could be part of the new information technology age. The Government has also allowed contributors to the Employees Provident Fund (EPF) to make withdrawals for the purchase of computers for the use of their children in institutions of higher learning and schools. Some contributors, however, have abused this facility. The Government is, however, confident that there are still many among public who wish to be in the mainstream of ICT development. Therefore, the government allows all contributors make withdrawals for the purchase of computers for their own use. In addition, the following measures were taken to promote ICT usage in general public:

i. New computers given by companies to their employees, which are presently deemed as benefit in kind, be exempted from income tax while such expenses incurred by the company be allowed as tax deductions;

ii. Government employees be allowed to apply for a computer loan once every five years; and

iii. Contributions in cash and in kind to projects promoting ICT culture be allowed as tax deductions.

Making the transition from a production to a knowledge-based economy is easier said than done. One thing is clear that: a K-economy would not happen without K-people. A K-professional, supposed to be in the business of knowledge management without an appropriate learning culture will be a thankless and largely fruitless task. To meet this challenge, many companies are promoting Chief Learning Officers (CLOs) to the board. Their remit is to create an environment that nurtures people with specific business or technical expertise as well as the flexibility, discipline and creativity to function in a climate of change. Today's students must develop such skills if they are to become fully paid-up members of the K-economy (Chan, 2002).

The extent to which one can retrain one's workforce, produce critical and creative citizens and develop a K-culture is dependent on the ability and willingness of the educational systems to move into the 21st century. Already, schools are beginning to incorporate creative thought into the syllabus and there is a much higher awareness of the need for a critical and communicative approach to teaching. How long this will take to filter through the hierarchy currently in place, however, is anybody's guess (Dias, 2001).

2.7 *ICT Implementation in Malaysian Education*

Information technology (IT) has made considerable inroads in our education system and more can be expected. In the primary and secondary school education, we are seeing the utilisation of computer technology, especially with the introduction of the nationwide smart school project and teaching of Mathematics and Science in English. At this level, the planning and implementation of IT has been in a more formal manner.

In 1999, 90 schools have been selected for the pilot project. It is expected that the results of the pilot will give directions for broad deployment for the rest of approximately 10,000 schools. Early in 2002 the Education Ministry have also supplied lap-tops to all the English, Maths and Science teachers in primary and secondary schools with appropriate software. The Pilot Project is trial-testing the Smart School Integrated Solution, which involves the following main components:

a) Browser-based Teaching-Learning Materials (and related print materials) for Bahasa Melayu, English Language, Science and Mathematics

b) A computerised Smart School Management System

c) A Smart School Technology Infrastructure involving the use of IT and non-IT equipment, Local Area Networks for the pilot schools, and a virtual private network that connects the pilot schools, the Ministry's Data Centre and the Ministry's Help Desk

d) Support services in the form of a centralised Help Desk, and service centres throughout the country to provide maintenance and support

e) Specialised services such as systems integration, project management, business process reengineering, and change management.

The Ministry is committed to utilising the following multi-prong strategies to ensure that the objectives of ICT in education are achieved.

a) The preparation of sufficient and up-to-date tested ICT infrastructure and equipment to all educational institutions

b) The roll-out of ICT curriculum and assessment and the emphasis of integration of ICT in teaching and learning

c) The upgrading of ICT knowledge and skills in students and teachers

d) Increased use of ICT in educational management

e) The upgrading of the maintenance and management of ICT equipment in all educational institutions (Chan, 2000).

2.8 Curriculum

A new curriculum is already in place for Form 1 and Form 4 for the 4 subjects; Bahasa Melayu, English Language, Mathematics and Science. It is basically based on the KBSM (The Integrated Curriculum for Secondary Schools) in terms of emphasis on knowledge, values and thinking skills. However, the added emphasis in Smart Schools is IT competency; globalisation and students are also expected to be proficient in an international language such as English. Students must also be able to build networks with students from other countries and collaborate in areas of mutual interest. In so doing, it is

hoped that this could be the foundation for collaboration in economic and social fields when they are adults (Ministry of Education, 1997).

Curriculum to be taught in schools is standardised and developed centrally. Obviously, to develop a generation of inventors and innovators require a very open, student-led curriculum, but because of various logistical constraints, this cannot be implemented at this early stage. Briefly, the curriculum contains the following elements: knowledge acquisition, values inculcation towards the development of the good person, analytical thinking and the ability to make decisions and solve problems, creativity and the ability to generate new and innovative ideas, proficiency in an international language, networking skills and a global outlook IT competence (Tell, 2000).

Core competencies and multidisciplinary is emphasised. Smart school emphasis of thinking, creativity, IT competence and globalisation are built into the four subject areas. This is the core knowledge and competencies that have to be mastered by each and every child before she or he leaves school. However, the curriculum makes a provision that the student, once he has mastered the core competencies, is in fact encouraged to cross-over into other disciplines, when pursuing a particular line of inquiry. In the long term, a multidisciplinary approach is favoured, and the freedom to bridge disciplines. One way this can be realised in the short term is not so much in day-to-day teacher-led activities, but in project work (extension activities) that may consume the better part of the school year.

The effectiveness of computer technology experiences at school depends on the students prior knowledge, the teachers,, access to hardware, software and scheduling (Dooling, 2000). If the children are to learn technology, they have to get to use the technology.

Computer will make a difference not only in the way children learn but also in the way their brains approach information processing. If students are only using computers for typing on word processing then they are more alike working on costly Pentium machines where work could be done with an electronic typewriter (Dooling, 2000).

2.9 Learning Strategies and Self Access

Information communication technology and the electronic resources would allow students to access information from various sources (books, journals, TV, Internet, etc.) independent of the teacher. The student would able to learn at his own pace without being held back by slower students or having to deal with material beyond his capability. The student would be allowed to explore topics of interest without being tied down to a rigid curriculum.

Smart Schools aim to produce knowledge workers to man the nation's high-tech industries in the 21st century. They are also meant to affect the technology transfer from advanced nations and to build up local technology through R & D within the MSC. As such, the school experience is meant to build up highly competent workforces who are able to create new products and processes. Classroom practice will therefore focus on

inquiry, discovery of knowledge and understanding, development processes and the design and creation of products. A practical emphasis, as well as research, information gathering, designs and production is what smart schools hope to bring about in the classroom. This goal however, cannot be achieved overnight as teachers need a gestation period to be comfortable with the new approach and culture.

2.10 ICT in Education and Assessment

When talking about education, the complexity of linkages associated with it must be addressed. When a new innovation is introduced, it does not merely address the delivery mechanism of the lessons but far beyond that, before the actual implementation and after that. That is one of the main reasons why things are not fully successful or effective. Let us take e-learning as a case in point. The true challenge of e-learning is putting together media selection, pedagogy, assessment, platforms, portals, performance tracking, coordination with other curricula and a sophisticated management system to coordinate and integrate and manage all the pieces that make up the learning system (Mitra, 1998). This does not include teacher education, infrastructure of the school, and maintenance of the equipment yet. Let us leave this deliberation for a later date but it is important to address the issue of assessment briefly. The endeavours to benefit from ICT in education are not helped by the dichotomy that exists in the area of assessment. Naturally, the teaching and learning process is subjected to some form of quantification by way of formal assessment such as examinations and various forms of it. At the end of the day, a major concern by parents and teachers alike are the grades obtained by the students,

namely the number of A's. There will be reports and publicity from students who excel, with them thanking God, teachers and parents and relating their long hours of study and the numerous candles burnt, the sacrifices, the discipline and hard work endured. Whether the students belong to a smart school or not, the story will most definitely be the same (Johannesen, 2000). It is yet to witness students thanking the Internet and the computer software's and the sporadic computer laboratory sessions nor any technology related accolades. That is because it will forever remain as a tool and becomes part of the furniture of the school, as much as you will not hear the beautiful garden in the school being thanked for getting 10 'A's. This is still not what the implementation process is getting at. Herein lie major mismatches insofar as the application of technology in education goes. It is known to all, by now that the wonderful things afforded to the students via educational technologies, but the format of assessment has not changed and has remained almost untouched. ICT now permits individual students to make individual progress and then measure his or her progress to general standards. Thus, it makes no difference whether a student has been able to capitalize on ICT in quest for knowledge and their ability to excel as their progress is 'capped' by the standards set through weekly or monthly evaluations (Rafferty, 2000). Of course students learn at different pace, all the more with ICT, they can venture further and faster than normal but are arrested at the designated evaluations. A more progressive assessment mechanism is indeed now necessary by way of flexible evaluations intervals, online and/or offline. On another note, the use of ICT has yet to give rise to an innovative evaluation mechanism other than the centuries old 'final exam', a paper based assessment. A scheduled once-a-month computer lab session is quite meaningless in terms of an actual learning process and

students will most definitely revert to the 'Buku Latih Tubi' or 'SKOR UPSR/SPM/STPM' for a more secure support. Those books will also enable the students to go through the sample questions and model answers anytime, anywhere. So, a RM4.50 book is sufficient for the students for the purpose of their learning and revision support.

2.11 Change in the teaching-learning approach

Certainly, what distinguishes Smart Schools from other schools are the use of technology to support and enhance teaching-learning. With the aid of multimedia technology, self-accessed, self-paced and self-directed learning can be practiced. This will allow students to develop their strengths to a level of excellence and breed a generation of inventors and innovators.

Computer- based activities will as such as utilising Software Applications ,data analysis using spreadsheets such as MS Excel and Lotus , report writing using MS Word and class presentations using MS Power Point Communication activities will be in the form of E-mail , forum with other schools and chat groups. Courseware and Educational Games will be interactive software to learn a new topic and educational games. Lastly the research (information access) will be based on web-sites , CD-ROM and digital library (Gillson, 1999).

2.12 Role of Management Staff

In the first year of implementation of ICT in schools, only 4 of the functions would be carried out electronically. These functions are school governance, student affairs,

educational resources management and financial management. It is expected that it will take time for school to build up the databases necessary to carry out management electronically (William, 2000).

The next 3 functions introduced in 2000 were hostel management, external resources management and technical management. Then, the last 3 functions were introduced in 2001 are human resources management, facilities management and security management. However, once all 10 functions are managed electronically, it is expected that the electronic government system will contribute greatly to the efficient management of the school and will avoid redundancy and wastage of resources especially human resources.

In the meantime, the role of the management staff is to bring about systemic change in the school culture from an examination dominated culture to a thinking culture. The principal and his/her administration team are also expected to implement training so as to bring about the professional development of teachers to enable them to integrate IT into teaching-learning. In addition, they are expected to manage IT facilities in school including maintenance, sharing of resources, time-tabling and etc. Online mentoring is another one benefit that can be derives from the ICT technology. When students need career advice, guidance about class or personal support, they can e-mail their mentors, professional people whose knowledge of real-world can help the students make decision (Duff, 2000).

2.13 Teacher Training

Teachers teaching the Smart School programme in 1999 were given a 14 week in service training course by the Teachers Training Division. The training is aimed at enhancing the practice of teachers to undertake their role as facilitators and guide (Tapscott, 1993). The curriculum consists of four main components with sub-components as given below:

1. Introduction
    a) Smart school concept
    b) Change management

2. Generic Skills
    a) Assessment and evaluation
    b) Critical and creative thinking
    c) Information technology
    d) Study skills

3. Organisation of Learning
    a) Smart school curriculum specifications
    b) Management of smart learning Classroom Practice
    c) Learning package
    d) Simulation
    e) Practical

4. Curriculum Implementation

The Teachers Training Division has also produced several modules to assist teachers to implement the new programme. The titles of the modules are:

a) Teacher Training Curriculum for Smart Schools

b) Guide Book on the Implementation of Smart School Teacher Training

c) Assessment and Evaluation

d) Critical and Creative Thinking

e) Study Skills

f) Facilitating Skills

For the first 6 months of 1999, the Teacher Training Division has also produced one package of resource materials for each of the four subjects. The packages give suggestions on how smart school teaching and learning can be carried out by utilising IT and without utilising IT. These packages ware distributed to schools in January 2000 (Chan, 2002).

2.14 Community Involvement

Smart schools encourage the involvement of various stakeholders in the education of the young. These can be parents and members of the community as well as business organisations that want a say in the type of employees that graduate from the school system (Morrison, 1997).

The Ministry of Education lauds efforts by these parties to get involved in helping schools wishing to turn 'smart'. The government will only be able to provide technology to schools in stages. It will take the government a long time to turn all 8,000 Malaysian schools into smart schools. Schools are therefore encouraged to turn 'smart' on their own initiative.

Sponsorship and aid can be sought from various sources within the community. These include: the corporate sector, parents and the community, payment of a small user fee by students and private sector contribution. These can range from small businesses to large multinational corporations. Having the right contact helps, and parents can be a valuable source of contact. A school can also indicate interest by writing direct to these companies to seek sponsorship since many of them have a social aid programme. Schools can form 'smart partnerships' with the private sector by offering premises and other facilities such as the school field or hall in return for contributions.

Sometimes a company may upgrade its system and give away old equipment, which in many cases can still be used. Currently, there have been instances of companies banding together to provide used computers and training to schools in disadvantaged neighborhoods.

The community around the school vicinity can be expected to play their role by giving assistance in the form of material goods or services. Members who can give assistance include the following: parents and the Parent-Teachers Associations, VIPs and

outstanding members of the community, Members of Parliament or the State Legislative Assembly member Old students of the school.

These people can be involved in the following ways: Make a financial contribution, contribute equipment organise fundraising activities eg. jogathon, fun fair, concert, etc. , train teachers and students in computer literacy ,assist in technical maintenance ,assist with contacts for sources of funding and material contribution .

2.15 Conclusion

From kindergarten, through primary and secondary into higher education, plenty of efforts are being expended to restructure content, curriculum and delivery modes. But despite this, there are still many pupils and students for whom education is an objective rather then a process or a complete learning experience. The continuing obsession in schools with position and grades is unhealthy. Competitive environment where SPM or STPM results are the end all of 11 to 12 years of time spent in schools. We should bear in mind that the word "education" means "to lead out". It does not mean "to overstuff with information".