THE PERCEPTION OF TEACHERS IN SEKOLAH MENENGAH KERAJAAN BARIO TOWARDS THE USE OF THE COMPUTER

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A Thesis submitted
in partial fulfilment of the requirements for the Degree of
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Declaration

No part of this thesis has been used to support any application to obtain a degree qualification in this university or in any other institutions of higher learning.
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Tingang Trang
31st December, 1999
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To my beloved wife, 
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for her patience, unfailing support, and labour of love

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Rona & Antonia 
for their patience and understanding

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ABSTRACT

The purpose of this study was to describe the perception of teachers in SMK Bario towards the use of the computer. This was done via a semi-structured one-to-one-interview, by looking at how they perceived six categories of computer use, namely, Usefulness of Computers, Impact of Computer Use, Teachers’ Feelings Towards Computers, Constraints in Implementing Computer Literacy Programme, Discrepancy in Teachers’ Computer Literacy Levels, and Ways and Means of Attaining a Higher Computer Literacy Level. Demographic factors investigated were gender, age, race, academic qualification, teaching experience, experience using the computer, computer use, number of computer courses attended, accredited training in using the computer, reasons for not using the computer, teaching experience, number of years using the computer, Computer Attitude, and Computer Literacy. The respondents for the study consisted of 12 teachers from SMK Bario, Miri, Sarawak. There were two parts to this study. Part I was Teachers’ Demographic Factors, Computer Attitude and Computer Literacy questionnaire to measure Computer Attitude Level and Computer Literacy Level of the teachers. Part 2 was a semi-structured one-to-one interview sessions between the researcher and teachers. Questions based on six category of computer use to measure teachers perception towards the use of the computer. Data collected in Part I was analysed using SPSS Version 7 and the findings described using descriptive statistics. Data collected in Part II was transcribed. Respondents’ responses were categorised by themes and sub-themes for analysis. The results of this study showed that the perception of teachers in SMK Bario was positive towards the use of the computer. The study showed that teachers used the computer for record keeping, printing of notes and handouts, formulating test papers and correspondences. 75% teachers believed that the computer would have a great impact on students, teachers themselves, parents, local community, the school and education as a whole. 100% teachers cited the computers (which were few and out-dated) as the main constraints towards computer use. 83% teachers cited the lack of rooms. 66.7% teachers cited transportation, 25% cited funding, 25% cited maintenance and 16.7% cited communication as constraints as well. The analysis of the responses to the Computer Attitude Level showed that all teachers were positive towards computer use. The analysis of the Computer Literacy Level items showed that all respondents were either at the intermediate or advance level. Implications for future Computer Literacy programme for teachers were discussed in chapter 5.
ABSTRAK

Chapter One

Introduction

1.0 Background

Toffler (1980) said that the world is experiencing the third wave, that is the revolution in Information technology (IT). In this Information Age, the computer enables information to pass back and forth between continents in seconds, by any form – voice, data, text, or image. The combined forces of telecommunications and computers will change things in a big way (Naisbitt and Aburdene, 1990). Malaysia is fast making inroads in the fields of Information Technology (Komputer, 1997, cited in Abdul Wahed, 1998) namely, through its creation of the Multimedia Super Corridor (MSC).

In 1982, two visionaries stood on the great divide of change and aptly predicted ten major changes that would shape the 1980s and ten more for the 1990s, which to a major extent have influenced the path of nation building and even beyond. They wrote:

We stand at the dawn of a new era.
Before us is the most important decade in the history of civilisation, a period of stunning technological innovation, unprecedented economic opportunity, surprising political reform, and great cultural rebirth. It will be a decade like none that has come before because it will culminate in the millennium, the year 2000 (Naisbitt & Aburdene, 1990, p.xvii.).

The writers described the trends that were shaping the 1980’s in terms of shifts, the first of which was from an Industrial Society to an Information Society. They went on to say that events do not take place in a vacuum, but occur within a social, political, cultural, and economic context. As we pass through the 1990’s and embark into the 21st century, the important thing, they advised was to form our own world view, our own personal set of megatrends to guide our work, ideals, relationships, and contribution (Naisbitt & Aburdene, 1990).

Malaysian Efforts towards the Challenges of the Next Millennium

In coping with the shifts mentioned by Naisbitt and Aburdene (1990), Malaysia aims to become a fully developed nation which has its own characteristics, based on its own model and having its own mould by the year 2020 (Mahathir, 1991). Various steps are being taken by the government to achieve the objectives of this vision. Among these are the implementation of policies and projects such as:

a. the National Information Technology Awareness Campaign (NITAC) launched on 11th October, 1997, and
b. the birth of the Multimedia Super Corridor (MSC) project in 1992, by the Prime Minister (New Straits Times, 1997).

During the launching of the NITAC, the Prime Minister called upon the people of Malaysia, regardless of age, social background or political leanings to “harness IT.” In addition, the rationale given for the creation of the MSC was to come up with an approach to develop the nation by using new tools which come with the Information age (New Straits Times, 1997).

In relation to this, as a means of preparing the future generation to shoulder responsibilities of developing the country in the IT age, the government has introduced and implemented the Smart School, one of the seven flagship applications in the MSC. The creation of an IT literate generation will certainly speed up the government’s effort of achieving vision 2020.
Vision 2020
Since its independence, Malaysia has embarked on a concerted target-based nation-building strategy. Starting with the five-year economic plans which culminated in the twenty-year National Economic Policy, Malaysia was ready to forge ahead, this time guided by a new milestone, Vision 2020 (Ahmad Sarji Abdul Hamid, 1993). In essence, Vision 2020 is a metaphor for a desirable futuristic goal, a promise of even better quality of life than what Malaysians had experienced through the successful implementation of the five-year economic plans and the National Economic Plan put together.

There are nine challenges that Malaysians must overcome before they can achieve this vision. The sixth challenge is to establish a scientific and progressive society. Research and development in electronics, especially semi-conductors worldwide promoted the use of IT in a big way. While remaining essentially an agricultural nation, Malaysia has become the third world’s largest manufacturer of integrated circuits, after the US and Japan (Naisbitt and Aburdene, 1990). In Malaysia, all dimensions of life are highly subjected to and dependent upon knowledge and information (Shotoku, 1993). The need to create an information-rich and knowledge-intensive Malaysia has led to the development of the MSC. As one of the means of preparing the future generation to shoulder responsibilities of developing the country in the IT age, the government had introduced and implemented the Smart Schools, as one of the seven flagship applications in the MSC.

Smart Schools
Malaysia aims to take advantage of the MSC infrastructure to begin the introduction of enabling technology to schools. In line with this ambition, 90 pilot Smart Schools have been identified nation-wide as the nucleus for the eventual nation-wide rollout of Smart School teaching concepts and materials, skills and technologies in 1999. By the year 2010, all 10,000 of Malaysia’s primary and secondary schools will be converted into Smart Schools (The Malaysian Smart School Blueprint, 1997), involving 5.8 million students and 450,000 teachers (Ministry of Education, 1997, p. 130).

The Malaysian Smart School is a learning institution that has been systematically reinvented in terms of teaching-learning practices and school management in order to prepare children for the Information Age (The Malaysian Smart School Blueprint, 1997).

The use of computer in teaching and learning is well received in the education fraternity because it is considered an efficient and effective teaching tool for both teachers and students. In line with the implementation of computer use in education, studies related to teachers’ perception with regard to computer suitability, weakness, effectiveness, burden, interest and readiness to use the computer in education and computer studies had been conducted.

Studies conducted by Kulik, Bangert and William (1983), Kulik, kulik and Bangert (1984), Kulik, Kulik and Schwab (1986) showed that computer based learning resulted in a positive effect towards the process of teaching and learning. Kulik and Kulik (1987) conducted a meta analysis study of 200 studies concluded that students who opted for a computer-based learning approach performed much better in their examinations. They had positive attitude towards their studies and towards the computer and they were able to shorten their study time as compared to students who were taught in the conventional manner. Kulik et al (1980, 1983, 1984, & 1985) also conducted a meta analysis study on the effect of Computer Based Learning (CBL) and Computer Based Instruction (CBI) on 175 students. Their findings showed that those who were taught using the computer had a higher mean score in their achievement tests as compared to
those who were taught using the conventional method of teaching. Apart from that, Kulik et al. (1980, 1983, 1984, 1985) also reported that Computer Managed Instruction (CMI) had contributed a great deal towards the performances of secondary and college students. Based on his studies, Kulik et al. concluded that a computer-based approach has an overall positive effect on education.

In the context of smart school education, students can use the computer as a tutor (Futrell and Geisrt, 1984), without having to be too dependent on their teacher (Bell, 1981), to explore the ‘microworld’ (Papert, 1980), to tackle complex problems (Morrison, 1988; Shinhora, 1984), and as a means towards co-operative learning (Hall and Rhodes, 1986) leading to co-operative writing, discussion, reading and research.

The benefits of computer-based learning listed by Roberts, Carter, Friel and Miller (1999) included increased motivation among students, enhanced understanding of abstract concepts, increased work rate, storage for huge amounts of information, and the creation of a conducive learning environment. How does computer education fare in Malaysian schools?

**Computer Education in Malaysia**

The Computer in Education programme was initiated under the Fifth Malaysia Plan to lay a strong foundation for a computer-literate society and to create a new culture oriented towards knowledge and information in order to nurture a generation of knowledge workers. In the Malaysian Smart Schools, the computer will take prominence in the classrooms. This implies that computer literacy is necessary for progress and development to take place (Mahathir, 1991).

Long before the idea of the Smart School started, the Ministry of Education had taken steps to promote computer literacy among teachers. According to a former Director of the Ministry of Education, Wan Mohd. Zahid (1995), trainees in all teachers' training colleges were offered computer literacy courses as early as 1992.

Meanwhile, teachers who are already in service will be asked to attend similar courses in order to equip themselves with the necessary knowledge and skills to enable them to facilitate teaching and learning activities, assist with school management, use the presentation facilities, e-mail or GroupWare for collaborative work, library / media centre with a database centre for multimedia courseware, and network resources like access to the internet (The Malaysian Smart School Blue Print, 1997). Wan Mohd Zahid (1995) predicts that by the year 2000, most of the teachers would be able to use the computer.

According to Rao, Rao, Zoraini, and Wan Fauzy Ismail (1991) all schools in the country were encouraged to set up computer clubs to provide basic computer education to students. Nevertheless, not all schools had the resources and means to initiate computer clubs. In addition to this, the schools faced a shortage of qualified teachers to take charge of the computer clubs (Rao et al, 1991). This is particularly true in rural areas (Ting, 1998).

In Sarawak specifically, five schools had been selected to participate in the pilot Computer Literacy Programme in the 1992-1993 session (Jabatan Pendidikan Sarawak, 1997) which was implemented by the Ministry of education in conjunction with the State Education Department under the Information Technology in Education programme. In 1996, additional seven schools were chosen to participate in this programme. The programme was further extended to include eleven more secondary schools in 1997.
In 1997, forty primary schools in Sarawak were also given the opportunity to participate in the literacy programme. Schools from rural areas were given top priority over town schools. It was hoped that students from rural areas who had no access to computer literacy classes and lacked financial resources to own personal computers would benefit from this programme (Ting, 1998).

Under this computer literacy programme, selected schools were equipped with computers and teachers-in-charge of the literacy programme in their respective schools were given training in the teacher colleges prior to the implementation the project (Ting, 1998).

**Computer Literacy**

In 1990, researchers from South East Asian Minister of Education Organisation (SEAMEO) and Regional Centre for Science and Mathematics Education (RECSAM) jointly conducted a research to gauge computer literacy levels in Malaysian secondary schools. The findings showed that more than 80% schools being studied had less than four teachers who were knowledgeable in computers. The study also showed that the number of computers in town schools far exceeded those in rural schools (Adbul Wahed, 1998).

In a recent study on Computer Literacy Level (CLL) among secondary teachers in the Kuching-Samarahan Division, Abdul Wahed bin Rosli (1998) found that majority (61.1% of 252 teachers) were assumed to be at the moderate computer literacy level categories. 33 or 13.1% teachers were assumed to be at the low CLL. If both the low the medium categories were taken to indicate unsatisfactory CLL, then a total 74.2% of secondary school teachers in the Kuching/Samarahan Division would fall into this consideration.

Based on his study, Abdul Wahed bin Rosli (1998) suggested that teachers teaching in rural areas need support in order to attain higher computer skills. They should rightly be given the appropriate support in this matter. First and foremost, their proximity to computer centres places them at a great disadvantage. The shortage or the absence of electricity supply certainly does not augur well for those who may be interested to own personal computers. Apart from this, the lack of efficient communication networks does not help in providing them with the much-needed access to the latest information, in particular information about the computer. Besides, in order for them to attend computer courses, they have to travel long distances, which in many cases prove to be very costly.

**Sarawak’s Rural Schools towards Smart Schools – Idealism and Realism**

The government had set the target for the implementation of the Smart School. Yet, many schools, particularly those schools in the rural areas, are handicapped by the absence of enablers such as telecommunication lines and IT facilities. In Malaysia, 86% of telecommunication facilities is found in West Malaysia. The other 14% are shared equally between Sabah and Sarawak. These telephone facilities tend to concentrate in large cities and towns where there are more industries and more people. In Sarawak, there are seven telephones for every 100 people. This figure is predicted to rise slowly to 15 per 100 by 2005, and 25 per 100 by 2020 (Harris, 1999).

There are many constraints in implementing telecommunication facilities like the public telephones. These telephones become targets of vandalism as soon as they are installed. Apart from this, they are poorly maintained (Harris, 1999). There are challenges like the physical environment, the lack of awareness and competence in using the IT. These telecommunication facilities are not connected with the Internet. Yet, according to Harris (1999), the rural areas tend to gain a great deal with the introduction of additional units of telephones or through the
installation of “Telecentres or Cyber kiosks”. The schools will benefit in terms of improved teachings and learning as well as increased IT literacy for both pupils and teachers.

The rural areas in the state of Sarawak are far from being developed. Villages are far from town centres. They are linked to town centres or one another via a network of gravel roads or via rivers. They enjoy basic facilities like piped water, lighting, medical care and education. However, telecommunication services are almost non existent (Harris 1999). To date, teachers had been relying on an array of teaching approaches, methods, strategies, techniques and skills, using different types of teaching aids to promote teaching and learning. What they need for the implementation of the Smart School programme is telecommunication facilities like telephone lines and computers. Sekolah Menengah Kerajaan Bario (SMK Bario), in the Miri Division of Sarawak is no exception.

SMK Bario
Sekolah Menengah Kerajaan Bario (SMK Bario), a rural lower secondary school is located in Bario, a sub-district of Marudi District council in Miri Division. It was established in 1967. It was then called Bario Secondary School. It assumed its present name in 1983 when the medium of instruction in school changed from English to Bahasa Malaysia, with the extension of the Bahasa Kebangsaan Acts of 1967 to the state of Sarawak.

The only secondary school on the Kelabit Highlands of Sarawak is located in the remote mountainous northern central part of Borneo at an altitude of approximately 1,000 meters above sea level. The only practical means of transport to this rural secondary school is the daily flight of the Rural Air Service of the Malaysian Airline System to the towns of Marudi and Miri (Harris, 1998).

All essential items necessary to run the school had to be transported by air from Marudi or Miri. SMK Bario enjoys such amenities as piped water, medical care services, and two diesel-operated generators for lighting. The school maintains communication with the District and Divisional Headquarters in Marudi and Miri via a high frequency radio. Presently, computer facilities in SMK Bario consist of 5 Personal Computers (486s), 2 printers (dot matrix) and 1 scanner.

In order for SMK Bario to participate fully in the smart school programme it needs to look for alternative source of electricity supply, telecommunication facilities and additional rooms which can be converted into computer laboratory. Needless to say, teachers need to attend computer courses in town from time to time, which is both time-consuming and expensive.

1.1 Statement of Problem
Although researches have been conducted in various constructs of computers such as computer literacy, computer attitude, and computer anxiety, very little is known about conditions in a really remote rural school like SMK Bario. In the light of the current drive by the government to successfully implement the Smart School project, the question of how well prepared the teachers of Sekolah Menengah Kerajaan Bario are in facing these challenges arise. What is their perception towards the use of computers? How knowledgeable are they in the use of computers? How much experience do they have in using the computer prior to their being posted to this rural school? What do they think about the existing infrastructure and facilities available in the school? What is their attitude towards the computer and its functionality? Will they be able to participate fully and effectively in the Smart School programme? What type of training do they need? What are the constraints that they face in implementing the Smart School programme?
These are but a few questions that need to be addressed before IT literacy programmes can be successfully enforced. There is a genuine need to investigate and describe the perception of teachers in the school towards the uses of the computer.

1.2 Objectives of the Study

1.2.1 General Objective

The main focus of this study is to describe the perception of teachers in SMK Bario towards the use of computers. The use of computers in this study includes such dimensions as their opinions on using the computers in the classroom teachings (e.g., Microsoft PowerPoint (MSPP) presentations), the feasibility implementation of the Smart Schools (SS) in SMK Bario, and constraints faced in the use of computers in SMK Bario.

1.2.2 Specific Objectives

Specifically, this study aims to describe the following:

1. the demographic features of teachers in SMK Bario;
2. the Computer Attitude of teachers in SMK Bario towards the use of the computer;
3. the Computer Literacy of teachers in SMK Bario;
4. the perception of teachers in SMK Bario towards the use of the computer with regard to teaching and learning;
5. the perception of teachers in SMK Bario towards the use of the computer with regard to its impact on teachers, students, school, parents, local community, and education in general;
6. the perception of teachers in SMK Bario towards the use of the computer with regard to their attitude towards the computer;
7. the perception of teachers in SMK Bario towards the use of the computer with regard to constraints faced in implementing computer literacy programmes (CLP) in the school;
8. the perception of teachers in SMK Bario towards the use of the computer with regard to the discrepancy in CLL among teachers; and
9. the perception of teachers in SMK Bario towards the use of the computer with regard to ways and means of attaining higher CLL among teachers.

1.3 Definitions of Terms

1.3.1 Perception

Perception in this study refers to how teachers in SMK Bario feel about the use of the computer. Their perception depends not only on the stimuli received but to a great extent on a combination of past experiences, needs, desires, value systems, beliefs, physical conditions, emotions, hopes and so forth (DeVeto, 1991).

1.3.2 Perception towards Computers

Perception towards computers, in this study, refers to how the respondents perceive the use of the computer (gathered through on-site interviews) based on the following themes or variables:

a. Computer usefulness for teaching and learning;
b. the impact of computer use on teachers, students, school, parents, local community, and education in general;
c. teachers’ attitude towards the use of the computer;
d. constraints in implementing a computer literacy programme;
e. discrepancy in computer literacy level (CLL) among teachers; and
f. ways and means of attaining a higher literacy levels;
The respondents’ perception will then be categorised and described, on the most part qualitatively, based on these themes to investigate their perception. Their perception will then be summarised as either positive or negative.

1.3.3 Computer Literacy
Rao et al (1991) define computer literacy as the general, basic and brief understanding of the design, use, information processing and social influence of the computers.

1.3.4 Attitude Towards Computers
Attitude towards the computer, in this study refers to what teachers feel about the computer and how favourable or unfavourable the computer is being evaluated. This includes the beliefs, the feelings of liking for the computer and the degree of comfort the teacher experiences working with the computer. Attitude towards the computer is measured through the responses of SMK Bario teachers to eighteen questions related to six categories of computer use.

1.3.5 Use of Computers
The use of computers in this study refers to how teachers utilise the computer for teaching and learning, teaching about computer, and administration purposes. Teaching and learning uses include preparing yearly, semester, weekly and daily teaching plans, preparing notes and handouts, and teaching using the computer. Teaching about computer uses may include such tasks as teaching computer terminology, knowing parts of the computer, how a computer functions, and how to use the computer for simple tasks such as word processing, playing computer games and using simple instructional programmes. Administration uses cover activities such as record keeping, preparing test papers and correspondence whereas teaching about computer also refers to activities carried out by the school’s computer club to educate students on how to use the computer.

1.3.6 Computer Experience
In this study, computer experience refers to teachers of SMK Bario’s computer experience which ranges from those who have no experience at all to those who are self-taught and those who have attended short computer courses being organised by Education Department, Sarawak, the Malaysian teachers colleges, and private computer centres.

1.3.7 Secondary School
The term secondary school in this study refers to Form 1 to Form 3 only (Education Act, 1996. P. 58).

1.3.8 Lower Secondary School Teachers
Lower Secondary school teachers are persons who teach pupils who have completed primary education (Education Act, 1996. P. 58). There are three categories of teachers teaching in SMK Bario, namely trained graduate teachers, trained non-graduate teachers, and untrained teachers. Trained graduate teachers are teachers with Degrees conferred by universities in any related field of education and are holders of Diploma in Education (Dip. Ed.) as well. Trained non-graduate teachers are holders of either Teaching certificates or Diplomas in Teaching conferred by the Teacher Training Division. Untrained teachers are those who are employed by the school to teach on a temporary basis. They could be either SPM, STPM, Diploma, or Degree holders who have not received any formal training in teaching.
Rural Schools

Rural schools are schools that are situated more than ten kilometres from the Divisional Education Headquarters (Sarawak State Education Department, 1997). Bario, which is a sub district of Marudi District, in the Miri Division, is more than 10 kilometres from any of the education offices, that is, either from Marudi or Miri. It is hence considered a rural school.

Significance of the Study

The Malaysian Smart School Blueprint (1997) appropriately states that information technology (IT) alone will not make a school smart. Only improved teaching and learning strategies, management and administrative processes, and capable, well trained people with an enthusiasm for their work can enable the process of transforming traditional schools into Smart Schools.

It is of utmost importance that teachers serving in the rural areas like SMK Bario are provided the necessary training in IT. Without a scientific approach to appraise the needs of the rural teachers, however, any genuine effort made towards upgrading their computer literacy and IT skills among teachers of SMK Bario will be rendered futile.

This study hopes to describe the perception and to gauge the needs of the rural teachers serving in SMK Bario with regards to the use of computers. A first hand information about the status of IT in SMK Bario obtained through this study will serve as a valuable source of information for policy makers, teachers, administrators and other educational personnel engaged in planning, implementing and evaluating the field of computers in education, particularly in relation to the introduction of computer education in a rural setting such as Bario.

Limitation of Study

The respondents in this study are teachers from SMK Bario. Therefore, the findings of this study may not apply to respondents in other professions.

The rural setting in this study should also not be taken as representative of all rural schools in the state of Sarawak or in Malaysia. The findings ought not to be generalised to cover all rural schools.

The accuracy of the findings in this study depends, to a great extent, on the degree of sincerity of the respondents when answering the items in the questionnaire and when answering questions during the face-to-face interview sessions with the researcher.

Summary

According to Davis and Davidson (1991) the labour force around the year 2010 will constitute today’s school children who are computer literate. As a first step towards creating a generation of computer literate work force, it is imperative that all teachers, particularly those serving in the rural and remote areas be given the necessary and appropriate training in the use of IT, especially the computer. A computer literate teaching force will hopefully facilitate the speedy and effective implementation of the Smart School programme. In the case of SMK Bario, a study of the teachers’ perception towards the use of computers in school will hopefully provide practical and realistic feedback regarding teachers’ training needs. Additionally, actual statistics of infrastructure, facilities and other forms of support needed by the school will be made available to the relevant authorities.
2.0 Introduction
This chapter discusses the theoretical basis for this study, the nature of perception, and literature review of studies related to perception towards the use of computer.

2.1 Theoretical Background
2.1.1 The Information Processing Theory
Cognitive theorists who use the information-processing theory approach to explain human perception, believe that people process information about the world around them just as a computer does (Hoffman, Paris & Hall, 1994). “Both get information from the outside world, register the information in symbolic form (encoding), combine it with other information, store it, retrieve it, and send it back into the world in a decoded form” (Hoffman, Paris & Hall, 1994, p. 44). This is represented in figure 3.

Most adherents of information-processing theory see no major change in the structure of the mind as children grow (Hoffman, Paris & Hall, 1994). Rather, they believe that thought and behaviour are built upon a series of separate processes that manipulate and transform encoded representations (Kuhn, 1988, cited in Hoffman, Paris & Hall, 1994). These processes include recognition, visual scanning of the environment, the analysis of perceptual events into features, learning, and the integration of the senses. With experience, basic capacities increase, and these processes become faster, more efficient and become automatic, thus enabling the perceiver to hold more information at one time (Case, 1985).

Paris and Lindauer (1982) state that children develop more efficient methods of storing information and retrieving them again, and they begin to understand how to direct the manipulation of information within the system as they grow up. They are able to build a rich network of concepts and a broad knowledge about how things are done as these developments take place (Flavell, 1985).

Information processing (Figure 1) begins with sensory registers sensing stimuli (sights, sounds, touches, tastes and odours) from the external environment. Sensitive cells in the sensory organs immediately process the information. It is further processed in the sensory register in the brain after which it enters the short-term memory (that the information processing system has) where it is encoded, elaborated and rehearsed. If not used, the information is stored in the long-term memory until such time when it is required. If the information is not used at all, it will be forgotten completely through decay (Newell and Simon, 1972). Decay is attributed to interference among symbols, time lapse between usage or the manner that information is being rehearsed. Aligned with the information processing process, a perceiver’s perception is influenced by either stimuli, past experiences, needs, desires, value systems, beliefs, physical conditions, emotions and hopes (De Vito, 1991).

Coren and Ward (1989) explained that meaning is assigned to what is being perceived when input from the environment matches with an image stored in memory. Best (1989) states that sensation, perception, memory and cognition are all part of an interactive process by which representation of external reality is constructed.
Figure 1: The Information Processing Theory adapted from Hoffman, Paris & Hall, 1994

Perception which is the final product in the chain of information processing is a cyclical activity (Neisser, 1976). According to Neisser, the perceptual cycle begins with the perceiver gleaning relevant information from the environment with the help of the sense organs, processes the information cognitively, compares this information to existing body of knowledge that the perceiver has accumulated over the years to lend meaning to what is being perceived. This cycle repeats itself, looking at different aspects of the stimulus or object each time, until the perceiver gets a complete picture of what is before him. He further says that perception depends on the skill and the experience of the perceiver to glean relevant information through the perceptual cycle. Perceptual activity is directed by pre-existing structures in the human mind, the schemata. The act of perceiving does not require remembering in the ordinary sense, but it is an activity in which both the immediate past and the remote past are brought to bear upon the present. For perception to be meaningful there must exist some form of knowledge with which the perceiver compares and matches what is being perceived. Neisser's explanation of perception starts with the stimuli, which are picked up by the sensory registers.

2.1.2 Cognitive Developmental Theory
According to the Cognitive Development Theory, a child comes to understand the world constructing his or her own knowledge of it. As the child grows, the mind forms action schemes which, in essence are patterns of action that are involved in acquiring and structuring of knowledge. As the child grows older, it develops "internalised action schemes" which are mental operations. Mental operations allow the child to manipulate, classify and understand relationships of object mentally (Hoffman, Paris & Hall, 1994). The child's thinking develops through the processes of assimilation and accommodation. Assimilation refers to the process of incorporating new knowledge into existing schemes while accommodation refers to the modification of existing schemes to incorporate new knowledge. "To assimilate is to use what one already knows how to do; to accommodate is to acquire a new way of doing something"
(Hoffman, Paris & Hall, 1994, p. 40). Both processes function throughout the life span. An individual can change his or her cognitive structures through a process called equilibrium, a balance between assimilation and accommodation. External events or internal processes may affect this equilibrium. When a state of equilibrium occurs a new position of “readiness” is assumed to allow for accommodation to occur. This leads to a new, higher stage of organisation.

2.2 Perception

Different people define perception differently. Roth and Bruce (1995) equates “perceive” with “see as”. According to them, we form conceptual categories of objects, entities or events that we perceive in the world around us. Our actions and responses are guided by these conceptual categories. Sekuler and Blake (1990), look at perception as a chain of events that start with events in the physical world, which culminate in understanding. Initially, stimuli (physical events) are picked by the sense organs. These are processed in the neurones, giving the perceiver a percept or an experience of what was initially picked up by the sense organ, thus enabling him to respond appropriately.

Perception refers to the entire process by which people receive visual information and act accordingly on the basis of that information. Between the time the information enters the visual system through the eyes and the time a person responds to it in some way, the information is interpreted, identified, compared to information that exist in the memory (Spoehr & Lehmkuhle, 1982).

Perception, according to Nessier (1976) occurs through seeing, listening, and feeling. These depend on pre-existing structures in the human brain called schemata, which directs perceptual activity and are modified as it occurs. Perceiving does not require remembering in the ordinary sense, but it is an activity in which both the immediate and the remote past are brought to bear upon the present. It is a continuous constructive exploration of an optic array by the perceiver moving his eyes or his head or his body. Information picked up modifies the original schema. Further exploration follows. Haptic perception or perception through touch does not have a specific machinery like seeing and hearing. The flow of haptic information in the nervous system is not funnelled through any single structure analogous to the retina or to the basilar membrane. Rather, neural activities in receptor cells all the way from the skin of the fingertips to the joint of the elbow and beyond relay the information to the brain.

Newman and Newman (1983) define perception as the process in which sensory experiences are organised and made meaningful. This definition explains how an individual interprets stimulus responses and assigns meaning to them. Perception is the manner by which an individual processes stimulus received as meaningful patterns. Gagne and Bringged (1970) explained that learning takes place when someone receives stimulus via the senses and processed it cognitively to effect a change in behaviour.

Jones (1926) on the other hand defines perception as a mental experience that occurs when an individual recognises certain objects that presented before him. It is an interaction between his feelings and past experiences.

According to Johns (1992), perception is a process of interpreting information from our senses to give us an understanding of the environment that exists around us.
According to Mahmood Nazar Mohamed, (1990), perception is a deliberate action of choosing and filtering information about an entity in the environment. This occurs when an individual pays attention to, interprets and organises information about, and understands that particular entity.

The definition of perception thus far, can be summed up as a cognitive process whereby an individual understands the world around him. The perceiver picks up stimuli from the immediate environment, filter out the irrelevant stimuli, process these stimuli cognitively, relying on past experiences and existing knowledge structures in the schemata, thus giving the perceiver an understanding of his environment. This whole chain process is called perception. Besides enabling the perceiver to recognise, learn new things, perception modifies the perceiver's behaviour thus causing him to act appropriately according to the demands of the environment he is in.

Ainon and Abdullah (1995), on the other hand define perception as interpretation of what is seen. This explains the diversity of perception that individuals have of one object, entity, or event. This argument is supported by DeVeto (1991) who explains that the difference in perception lies in the subjectivity of perception due to numerous conditions imposed on the operation of perception by internal and external factors like past experience, needs, desires, value system, belief, physical condition or emotion at that particular time. Therefore, individual perception of the same object may differ and may change from time to time, depending on the interactions between external and internal factors that exist.

2.3 Teachers' Perception towards Computer Use
A combination of the Information Processing theory and Cognitive Developmental theory can explain the perception of teachers towards the use of the computer. In the teacher training college, for instance, where they were given sufficient exposure in the art of teaching, teacher trainees form their own understanding of classroom pedagogy, psychology, teaching theories, teaching approaches, techniques and skills. They were required to undergo practical sessions on how to use teaching aids that range from simple paraphernalia to sophisticated gadgets like the computer effectively and efficiently. Apart from these, teacher trainees were subjected to expectations, education philosophy, policies and government directives that form the backbone of their larger vision and mission. Upon graduation and posting to receiving schools, teachers had to make necessary changes in order to acclimatise themselves with their new work environment that may differ greatly from the more familiar environment they were used to.

Regardless of when they were first introduced to computers and the manner in which they first had hands-on experience of computers, they would have formed a perception towards the computer. This is a subjective process, which involves interpretation and evaluation on the part of the perceiver (DeVito 1991). The process of interpretation-evaluation is not based solely on stimuli but is influenced to a great extent by a combination of past experiences, needs, desires, value systems, beliefs, physical conditions, emotions, hopes and so forth. This process of interpretation-evaluation will lead to a position of equilibrium requiring teachers to make changes deemed necessary.

The realisation for the need to prepare themselves for the eventual implementation of the Smart School will no doubt spur teachers to be more proactive in taking steps towards improving their CLL to enable them to contribute towards the Smart School programme in a more effective and efficient manner. In itself, awareness of their individual needs to self-improve becomes an