

CHAPTER 1

INTRODUCTION

1.1 Background

In the 1990s, Information and Communications Technologies (ICTs) have brought about profound changes in our society. It has increased our capacity not only to communicate but also collect, process, disseminate and access information. Here Information and Communications Technologies refer to telecommunications, computers and microelectronics which produce the phenomena of electronic networking and interactive multimedia. Since the Information and Communications Technologies have the ability to procure, store and process vast amounts of information, today's workplaces demand tougher requirements than ever before. They need workers who can manage this information to solve problems and make decisions. These individuals must learn in a rapidly changing environment and build knowledge taken from numerous resources and different perspectives. They must be able to understand systems in diverse contexts and collaborate locally and globally.

As such these attributes that are needed to function in the new information age must be acquired in school. Schools must therefore prepare the students to meet these challenges.

1.2 The need to change teaching/ learning strategies

Even though changes in technology and work requirements are taking place in our society at large, the education system remains basically unchanged. A dramatic rift has occurred between the process of teaching and learning in the schools and the ways of

obtaining knowledge in society in general. The result is an estrangement of the schools from society.

According to Soloway(1991) cited in Strommen (on-line), “ this estrangement has had pronounced negative effects. It has caught out children in an awkward bind as they move toward the future, the institutions responsible for educating them are locked in the past. In the classroom knowledge is presented to them in a linear didactic manner that differs dramatically from children’s previous experience outside the school. In contrast with the vivid images and self- directed flow of the interactive home and society, school seems to the children rigid, uninteresting and ultimately alienating”.

The attributes needed to function in the new information age such as the ability to think critically, strategically and process vast amounts of information to make quick decisions, contrast sharply with the low level skills, content and assessment methods that traditional ways of teaching favour.

Traditional ways of teaching here refers to the teacher centered approach. In this sort of strategy the teacher often imparts his personal interpretation of the syllabus.

“ It is generally true that teacher-centered strategies at most levels of education encourage neither intellectual curiosity nor an individual student’s responsibility for organizing and planning his learning....”(Percival & Ellington, 1984,p.34).

The main teaching method used in a great majority of teacher centered lessons is the lecture method or “chalk and talk” method. Expository methods are probably the most widely used teaching technique leaving little space for critical or creative thinking by the students.

Giving written class exercises after each lesson emphasizes memorization of facts and figures by rote learning. Sometimes teachers give notes to supplement the information during the lectures. In teaching concepts that need demonstration, it is the teacher who demonstrates. In carrying out practical work teachers often impose their way of carrying it out. The whole approach is teacher centered and the sole objective here is to deliver information and processed facts so that students can memorize and score highly in examinations set by external bodies. There is seldom time for student centered activities that encourage higher order thinking skills because the teacher spends most of the time teaching a pre set syllabus, drilling the students to meet the requirements of the external examining bodies.

On the other hand, the new workplace requirements for learning are incompatible with instruction that assumes, the teacher is the information giver and the student a passive recipient. The workplace of the information age requires individuals to possess the skills to seek and manage information that is available in abundance from the ICTs. These skills can be acquired in school if students themselves are actively involved in the learning process. Teachers must create opportunities for students to seek, analyze, synthesize and evaluate information to solve problems or to make decisions. In this way higher order cognitive processes or higher order thinking skills are developed in the student.

1.3 On higher order thinking

The new workplace require workers who must be able to recognize when information is needed and have the ability to locate, evaluate and use effectively the needed

information. These skills involve higher order cognitive processes that must be cultivated in the teaching learning process.

Most educators have often referred to Benjamin Bloom's taxonomy of cognitive skills to develop and deliver teaching and learning activities that promote these skills. The lower levels of knowledge and comprehension in Bloom's hierarchy are intended to lay the foundation for the successively higher levels of thinking: application, analysis, synthesis and evaluation.

Lipman (1984) expanded the meaning of higher order thinking skills while focusing on the same objective of analysis, synthesis and evaluation. He promoted the culture of higher order thinking through the teaching of dialogue. This approach is designed to foster the habit of reflective thinking rather than the habit of looking to a teacher, to a book or to a formula for a ready made answer.

A more specific behavioral characteristic of higher order thinking skills was presented by Costa (1993). The characteristics include the ability to persevere, listen, be flexible in thought, reflect on one's own thought processes, be able to test one's ideas, inquire and explore scenarios, apply existing knowledge to enlighten new problems, be precise in language and thought, use all five senses to gather data and synthesize creatively.

Edward de Bono (1984,p.16) summed up the meaning of higher order thinking as the "creative elements necessary for solving real problems".

This meaning suggests that students' work in school should be guided by projects that they can relate to and to the greatest possible degree involve them in authentic intellectual activity.

With the changing needs of the work place of the information age it becomes a necessity to focus on cultivating and promoting higher order thinking skills. The ICTs have the capabilities that can be taken advantage of in order for the present day student to learn the required skills and reach his maximum potential.

1.4 Integrating ICTs as the answer

Education utilizing, ICTs is seen by many as having the potential to better equip students for living in a society ever more rapidly affected by technological innovations and in which the expansion and updating of personal skills and knowledge is constantly required. Thus, policymakers and educationists have started defining the role, which the new technologies can play in primary and secondary education. It is believed that ICTs can increase the effectiveness of the education process as well as its overall efficiency in terms of classroom activities and school administration. The new technologies have the potential to promote the development of higher cognitive processes such as the ability and tendency to gather, evaluate and use information effectively.

According to New Times Demand New Ways of Learning, (on-line,1997) “The new Information technology can become the most significant tool in teaching critical thinking skills. It has the capability to provide challenging tasks, opportunities and experiences. For example, it can provide complex problems and cases; links to challenging curricula and unique resource repositories from museums and libraries, opportunities to examine contrasting events or data sets. It also provides access to experts, peer community members or other learners who can guide, mentor, tutor, share and inform users in learning in productive and meaningful ways. Rich media resources like three dimensional

images, audio, video, virtual reality, provide data for manipulation and for presentation. Tools such as scenarios and simulations provide opportunities to develop expertise using real world problems and resources. These tools let the users plan, reflect, make decisions, experience the consequences of action, change direction and examine alternative solutions and assumptions; all of which are tools for critical and creative thinking”.

Acknowledging the significance of ICTs in education a number of countries have taken the initiative to establish national educational networks which are usually linked to the Internet. Examples of these are Schoolnet (Canada), Educational Network (Australia) and School Network (Austria).

Malaysia has also followed suit by establishing the Smart Schools under one of the flagship applications in the Multimedia Supercorridor. In these Smart Schools, ICTs will be widely used in teaching and learning activities.

These developments have created an intense debate in the field of education as to the advantages and disadvantages. Initially, computers were only regarded as a subject of study in the school curriculum, such as computer literacy or computer programming. Even computer assisted instruction (CAI) was for drill and practice, which the teacher or syllabus had already pre-planned. At present there is a move towards the overall enhancement of the educational process by integrating ICTs into the teaching of all curricular subjects. However classroom activities involving the use of these technologies need to be carefully structured by the teacher in order for them to promote higher order thinking skills and problem solving skills. Teaching strategies have to change from the traditional teacher centered learning to student centered learning where the responsibility of learning is shouldered by the students themselves. Teaching methods that can take

advantage of the capabilities ICTs in the classroom to promote higher order thinking skills must be used.

1.5 Teaching methods using ICTs that can promote higher order thinking skills in the classroom

The ICTs can provide vast amounts of resources for the classroom teacher.

It is often up to the innovative teacher to creatively manipulate or combine these resources to teach so that students can acquire higher order thinking skills. Some of the methods that can be used by the teachers are as follows:

1.5.1 Problem solving

In this method of teaching, students are given problems to solve whereby they can explore, examine and build situations. The software for these activities include adventure games, simulations, databases, expert systems and statistical analysis programs. Here the student's attention is focused on those aspects which are relevant to the problem introduced.

1.5.2 Projects

Here students can work independently or in groups investigating a problem of some sort, chosen by the student or group in consultation with a teacher or supervisor. This strategy allows students to exercise initiative to see practical applications of a subject, to cross subject barriers, to probe deeply into a particular area of study and to become responsible for organizing and structuring their activities. Students can use the new technologies to examine and explore by accessing resources on-line through the Internet or off-line using CD-ROMs.

1.5.3 Collaborative learning

This strategy can be used especially in the study of Science. Students need to be able to ask personally meaningful questions which engage non-trivial content which are capable of driving their investigations. The question or problem helps students organize their activities. They should be able to design their own investigations. In this sort of learning they need to collaborate with other students as they make meaning of the results of their investigations. Students need to discuss and try out their ideas and challenge the ideas of others. They also need to create projects, reports or other artifacts through which they can share what they have learnt. Above all they need sound technological tools which support their inquiry. This is where the role of the computer via the digital library can become a vital tool in learning. Students can also communicate using electronic mail and desk-top video conferencing.

1.5.4 Role-play

In this sort of learning students can be given the role of economists, judges, town planners, health officers and other roles that involves decision making. They can be given programmed data in a simulated interactive environment using multimedia. By analyzing and manipulating the data they can render their decision at the end of the lesson.

1.5.5 Games

Students' knowledge of concepts can be applied in an interesting, challenging and enjoyable game format. After each success in the game they are playing they will be rewarded. Students' interest is maintained with the usage of attractive multimedia programs. To gain more information in order to win in the game, students can be given

opportunities to explore databases using hypermedia (a technology that allows searching, linking and assembly of information under the student's control).

1.5.6 Student writing for an authentic audience

Studies have demonstrated that telecommunications is particularly valuable in improving student writing. Students are more comfortable with and adept at critiquing and editing written work if it is exchanged over a computer network with students they know. School students are able to write higher quality essays for a networked audience than for their classroom teachers. Student writing that is shared with other students over network tends to be of higher quality than writing produced for class use only.

1.5.7 Electronic field trips

Field trips often make learning more meaningful for students. This method of teaching is seldom used considering its high costs and physical risks. Using the Internet to conduct field trips provides a new and exciting way of learning without having to physically move to the intended destinations. Students can actually visit some of the best Science museums, the Niagara Falls or the Library of Congress without having to leave the country. The Internet usually provides sound effects, video clips and a lot more of information in an interactive nature. Students can have a two-way communication with anyone through electronic mail in the course of the trip.

By looking at the various ways ICTs can be used in teaching, it can be acknowledged that its powerful benefits are realized when students use it to achieve higher order learning and thus acquire critical and creative thinking skills in the process.

1.6 Statement of the Problem

Even though the benefits of ICTs in teaching and learning are acknowledged, its use is often limited to teaching low level skills like delivering knowledge and reinforcing it as in drills and tutorials using CAI.

According to Byron (1997,p.4), “ New technologies, as various research outcomes have shown, are often used to support traditional learning methods and not to promote new approaches to learning”.

A working paper prepared by the Curriculum Development Center of the Ministry of Education, Malaysia, (Low, 1993) has recommended an integrated approach in the teaching and learning of thinking skills. In this approach the development of thinking skills is integrated into the teaching of subject matter through suitable learning activities and teaching methods. Instructional methods recommended among many include the use of cooperative learning, questioning techniques, structured worksheets and project work. The higher order thinking skills as depicted in a model as conceptualized by the Curriculum Development Center comprise creative thinking, critical thinking, problem solving and decision making. At the same time the Ministry of Education, Malaysia has also embarked on various projects to promote the use of ICTs for instruction in the classroom.

There are teachers who have become computer literate and are aware of the potentials of the ICTs in education. It is these teachers who are the focus of this study. This project was carried out to investigate whether the teaching methods used by these teachers enable use of ICTs that promote higher order thinking skills. It also attempted to seek answers to the question why teachers who are computer literate and are aware of the resources

available from the ICTs are unable to use it in teaching to promote higher order thinking skills.

1.7 Research Questions

In line with the aspirations outlined above this project was carried out to investigate the teaching methods using ICTs to promote higher order thinking skills. It focused on the following research questions:

1. What teaching methods are teachers with computer literacy using to teach in the classroom? How frequently are they using these methods?
2. How often do they promote higher order thinking skills while teaching?
3. Are the teachers aware of the resources available through the ICTs that can be used for teaching?
4. Do the teachers know how to use teaching methods that can use ICTs to promote higher order thinking skills?
5. What are the problems the teachers think limits their use of ICTs in promoting higher order thinking skills?

1.8 Significance of the Study

At a time when the Malaysian educational policy makers are emphasizing the need to prepare students to function in the information age, this project paper hopes to add information that may be useful for its implementation.

It is hoped that the results of the findings from this project paper, would serve to highlight the importance of pedagogically preparing the teachers to take advantage of the resources that are available through the ICTs. Computer literacy alone is not enough .

Teachers need to have knowledge of teaching methods that uses ICTs to promote higher order thinking skills which has become a necessary skill to be able to function in the information age.

It also gives some insight into why teachers who have acknowledged and are aware of the benefits of ICTs were unable to use it in their teaching at present. The suggestions put forward can provide some idea of how the problem of integrating Information and Communications technologies in teaching can be overcome.

It is also hoped that some of the findings and recommendations of this project paper may be of use in the process of formulating courses for teacher training to integrate ICTs in the classroom for the purpose of promoting higher order thinking skills among students.

Lastly it is also the hope of the researcher that the findings of this project paper will spur further investigations in this field from a wider perspective.

1.9 Limitations of the project

The findings of this project paper cannot be used to generalize for the whole population of schoolteachers in Malaysia who are computer literate. This is because of the small size of the sample that was chosen at random. The small size was due to the nature of the project which was intended to be on a small scale.

The constraints of the instrument which was a questionnaire that was mostly in the form of check lists and required responses that were close-ended also limited the study.

Due to the time factor, other perspectives like the students' point of view of the teaching method used in the classroom was not investigated.