

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

With the advent of the information era, advances are being made in the field of Information and Communications Technologies (ICTs) which allows easy access to information. Skills that are needed to seek, process and use the appropriate information must be cultivated among the users. The workplace of the future will demand workers who possess these skills. Schools should take the first step in preparing students to function in the new work place by providing them these skills which are actually skills requiring higher cognitive abilities or referred to in this study as higher order thinking skills.

In the process of providing these skills teachers should not be contented with just teaching low level skills such as memorizing and comprehension of information delivered by the teachers. Instead they should make attempts to shift from using teaching methods that are suited to provide information to methods that actively involve students as participants in the learning process.

This project paper investigated what teaching methods are being used by teachers who are aware of ICTs and their capabilities. It attempted to investigate how often they are promoting higher order thinking skills. It also analyzed the awareness of availability of resources from ICTs and whether they knew how to use it in teaching to promote higher order thinking skills. The problems that limits their use of ICTs in promoting higher order thinking skills was also analyzed.

In this concluding chapter the implications of the findings are discussed and conclusions drawn. Recommendations are also made on how to overcome some of the problems that limits the use of ICTs to promote higher order thinking skills.

5.2 Implications of the findings

The implications and conclusions based on the analysis of results of the findings of this project paper are discussed as follows.

5.2.1 Teachers favor teaching methods that enable delivery of large amounts of information

The findings of this project paper implies that teachers use a variety of teaching methods but they favor use of teaching methods that are suitable for delivering large amounts of information to students. The Lecture method sometimes also known as the "chalk and talk" method is the most frequently used method followed by Written class exercises which supports its use. These two methods may be advantageous to the teachers who are preoccupied in trying to cover the syllabus, in order to prepare their students for either school examinations or Public examinations. Although this method can be considered cost effective and time saving, it does not provide many opportunities for student participation in the learning process. This feature makes it less conducive in developing higher order thinking among students compared with more interactive methods like in Inquiry learning, Projects, Collaborative learning, Role-play and Simulations.

According to Percival & Ellington (1984, p.61), " Research studies aimed at comparing the lecture with other teaching methods have shown that it is not particularly effective in developing high-level thought among students (Blooms higher cognitive

areas) compared with methods of learning such as group discussions or participative simulations which involve more student activity".

If teachers go on playing the role of information providers rather than teaching students to manage information then even if ICTs are used they may take the form of Multimedia presentations and Computer Assisted Instruction that is integrated in the lecture method. This would only end up performing more tasks of delivering information to students rather than providing them with higher order thinking skills.

5.2.2 Teachers are making attempts to promote higher order thinking skills

From the results of the survey it was found that most of the teachers promoted higher order thinking skills while teaching. By further investigation of the respondents who scored high for frequency it was found that they scored high because of their use of teacher centered techniques rather than activities that were student centered. This finding suggests that teachers could have built in "buzz" sessions while teaching using the lecture method.

In this type of sessions, teachers try to break the passivity of the students by asking them questions and engaging them in short discussions either on their own or in groups. After that they are to feed back information to the teacher about the task they were given to do. It is probably in these sort of sessions that the teachers used questioning techniques and set short tasks like problem solving and predicting outcomes that is activities (see Appendix A, Section 3) that promoted higher order thinking skills.

5.2.3 Teachers are reluctant to use teaching methods using ICTs that promote higher order thinking skills.

The fact that methods like Field trips, Projects, Role-play and Games are the least frequently used teaching methods by the teachers suggests that they are not making use of

the most effective methods to promote higher order thinking skills. All these methods are active learning methods where the students shoulder the responsibility of learning. For example, in Field trips students learn to look for the necessary information at the site of visit, organize these information, process and then make reports. For projects, the students can work in groups on investigating problems of their choice. They need to apply, analyze and make decisions with only a little guidance from their teacher. Role-play and Games also require high level cognitive abilities relating to such things as analysis, synthesis and evaluation.

There could be several reasons why teachers are reluctant to use these methods that are considered as highly effective in promoting high level of thinking among students.

i. Lack of empowerment

In all these methods of teaching a high degree of empowerment by the teachers to the students is required. The data collected when the teachers responded to use of activities that promoted higher order thinking skills showed that only five teachers used more student centered activities than teacher centered activities. This means that there is a lack of empowerment to students. The reason for this could be the resistance towards acknowledging the changing role of teachers from information dispensers to guides or facilitators while carrying out activities that promote higher order thinking skills. This notion is put forward by Hannafin & Savenye(1993, p.29) who say, " If the accepted view in society is that knowledge is imparted from teacher to learner, then the notion that learning can occur by unsupervised exploring and by probing unstructured open-ended problems will probably be resisted by society".

as the teacher fearing societal pressure resists the change that is needed and carries on presenting information and directing all activities in the classroom.

ii. Difficulty in assessing students

Another reason for low frequency of use of methods like Field trips, Projects and Role-play could be the difficulty of carrying out a fair and objective assessment of the students' work. Usually a tangible product of the learning process is graded, like a report, conclusion, decision or even a model. This way of grading is often debated because it does not reflect the actual amount of work that has been carried out. On the other hand, it is the actual planning and doing that requires a high degree of cognitive skills and is considered as important.

iii. Requires knowledge of multidisciplinary skills

Teaching methods like Field trips, Projects, and Role-play require multidisciplinary skills. These methods integrate concepts from various disciplines into a cohesive and balanced "world picture" especially in activities where they relate current issues to the topic being learnt, evaluate situations, solve real-life problems, predict outcomes and make value judgements. It could be that teachers are reluctant to use these methods of teaching because they are not confident enough to be involved in activities that require knowledge from outside their specialized areas.

iv. Lengthy and inconvenient nature of the activities

Also the nature of these methods of teaching, being lengthy activities may not be able to fit into the normal rigid academic timetables, as practiced in schools today. In the case of Field trips, besides the hassle of planning and red tape involved in taking students out

of school for learning, the teachers also have to ensure the safety of the students. As such these inconveniences could be one of the probable causes for its low frequency of use.

5.2.4 Teachers lacked pedagogical skills in using ICTs to promote higher order thinking skills.

This conclusion was drawn from the finding that the usage of methods using ICTs for teaching was found to be much lower for every method listed in the questionnaire. In fact two of the methods like electronic field trips and student writing for an authentic audience have never been used by any of the teachers in the survey.

From the analysis of results, it showed a high co-relation between knowledge of use and actual use of the methods in teaching. This suggests that if teachers were given more exposure and training in these methods then the usage of it would be higher.

At the same time the finding that their usage scores were all lower than their knowledge of use scores implies that there could be problems or obstacles to their usage in teaching.

5.2.5 Teachers claimed to face the following problems that limits the use of ICTs to teach higher order thinking skills.

i. Unavailability of ICTs

The respondents in this survey were all teaching in government funded schools. This implies that the availability of these resources for teaching depends on government policy towards ICTs use as well as the financial allocations for these schools.

ii. Expensive nature of ICTs

The teachers also claimed that ICTs are too expensive as a resource for their schools. The expensive nature of ICTs in terms of hardware, software and maintenance costs makes schools invest their limited funds on non-electronic resources for teaching

It is heartening to note that as ICTs started making an impact on overall socio-economic development in Malaysia, the government began to formulate policies at exploiting the "Information Superhighway" for the purpose of education. At present the government policy indicates concern for the full integration of ICTs into the education process by the setting up of Smart Schools.

According to the plan of the Ministry of Education "...eighty five schools will become Smart Schools starting in 1999 and gradual upgrading of all schools to become Smart Schools by 2010", (Text of speech by Dato' Seri Mohd. Najib Tun Razak, Seminar on Smart School, 3 February, 1997).

With the setting up of Smart Schools it is assumed that electronic resources will become part of its infrastructure costs maintained with government allocations.

iii. Limited Software

A considerable number of the teachers seem to consider the limited availability of software that suits the school curriculum as a factor that limits the use of ICTs to teach higher order thinking skills. This reflects the lack of pedagogical skills in using resources from ICTs to promote higher order thinking skills.

Teachers should not treat the lack of software that suits the school curriculum as a problem. Instead teachers should try to change their strategies by giving students more autonomy and empowerment in the learning process so that students can look for information from web sites, databases, digital libraries and discussion groups to build knowledge from there on their own.

iv. Large classes

A considerable number of teachers in the survey claimed that classes are too large to use ICTs effectively. Sufficient attention by educational policy makers and school administrators should be given to the teachers' perspective of the daily working environment that prohibits the use of ICTs in the classroom.

v. The English language is a barrier to the usage of ICTs in Malaysian schools

The English language is a barrier to the usage of ICTs by Malaysian students who are not well versed in this language. It would help if some innovative technologist can produce a software that can immediately translate all web pages in English to Bahasa Melayu on the Internet. For the time being efforts should be made to raise the level of English among Malaysian students or produce more resources like CD-ROMs and web pages in Bahasa Melayu.

vi. Too much time is wasted in devising appropriate ways to incorporate teaching of higher order thinking skills using ICTs.

This problem could have come about because teachers are not pedagogically prepared to teach higher order thinking skills using ICTs. In addition the teaching materials especially educational software are not in serious educational material. Ideally teachers should be involved in the preparation of educational software because they are the experts in classroom dynamics.

vii. Higher order thinking skills are considered unimportant for examinations.

Even though this problem was claimed by only a small group of teachers in the survey its implications are serious. This is because when teachers use ICTs to promote higher order thinking skills, the learning outcomes must be assessed in a holistic manner and not just with paper and pencil tests that assess low level thinking skills.

viii. Difficulty in disciplining the class

A small group of teachers in the survey think that the class becomes "out of control" when using ICTs in the classroom. This cannot be concluded as a problem because studies using ICTs in the classrooms have shown students actually become more interested in learning when teachers use methods that promote higher order thinking skills using ICTs. This is because the activities are student centered and can be highly motivating and enjoyable if carefully planned by the teacher .

ix. Other problems

Individual teachers claimed problems like lack of exposure to this new media. among rural students, phobia towards ICTs, lack of exposure and training in teaching to promote higher order thinking skills and lack of support from the school administration on the use of ICTs in teaching.

It is hoped that all these problems would eventually be overcome when the government policy towards use of ICTs in education is implemented fully in the Smart School Project.

5.3 Conclusion

It can be concluded from this project paper that even when teachers are computer literate and are aware of the capabilities of ICTs, they are still using teaching methods that make them take on the role of information providers. If schools are making attempts to prepare students to function effectively in the information age, then teachers must be prepared to take on the new role of teaching students to seek and manage information.

Teachers are attempting to promote higher order thinking skills but the strategies they use are unsuitable for using ICTs. More student centered activities must be used to effectively promote higher order thinking skills.

Teachers also lacked pedagogical skills in using teaching methods that use ICTs to promote higher order thinking skills. Knowing how to use computers alone is insufficient. Teachers must be trained to use it for promoting higher order thinking skills.

The teachers also face many limitations to the use of ICTs for promoting higher order thinking skills at present. Some of the problems like unavailability of ICTs and its high costs are beyond the ability of the teachers to overcome them. Teacher training and changing educational policies can overcome other limitations.

5.4 Recommendations

In view of the problems faced by the teachers in using teaching methods with ICTs to promote higher order thinking skills, the following recommendations are made.

5.4.1 Provide teacher training

Educational policy makers should realize that spending huge funds on setting up infrastructure needs of ICTs would not benefit students if it is not complemented with teacher training. Training of new teachers or in service teachers should focus on the pedagogical aspects of ICT usage. Orientating teachers on the use of computers and the Internet is insufficient. They must be taught how the resources from the ICTs can be used to stimulate and promote thinking skills of students. Teachers also need to be trained on student centered teaching strategies.

In their training courses they need to be made to understand and accept the new challenging role of the teacher in future. They should not be intimidated by the idea that information is easily accessible and their students may sometimes know more than they may. Instead teachers should show students how to integrate the huge quantity of information into their lives. Their role will also be of counselors where they will be required to encourage and stimulate students to obtain a full education.

Teacher training should provide all these changes in the thinking paradigm of teachers.

5.4.2 Provide all schools with ICT facilities

This is a necessary investment. All schools irrespective of urban or rural must be provided with this facility. In order to be able to implement the methods of teaching to promote higher order thinking skills effectively, computers should be accessible to all students and all schools should be connected to the Internet. Class size should also be realistic for this type of teaching.

5.4.3 Involve teachers in software development

In the development of software for educational purposes, teachers should be consulted and be given to test out the final product before it is widely used. By capitalizing on the knowledge of classroom heuristics possessed by the teachers software producers can produce attractive multimedia presentations as well as ones that suit the needs of the teaching methods.

5.4.4 Make changes in the assessment system

With information flowing in abundance from the ICTs the assessment of students for memory and comprehension skills is unrealistic. Assessment should be holistic, taking into consideration the higher order thinking abilities of students like applying concepts,

analyzing, synthesizing, evaluating and creative thinking. In addition to centralized examinations, there should be a move towards decentralization of assessment of some the student work. In this way, their own teachers can assess outcomes of activities using ICTs. Learning outcomes from project work, collaborative work, inquiry learning and all the other methods mentioned earlier that use ICTs to promote higher order thinking skills can be assessed in a manner that provides an accurate picture of a student's achievement. Instruments like work samples, checklists, calendar records and criterion-referenced tests could be used in addition to the usual paper and pencil tests. Unless the emphasis on paper and pencil tests is reduced, teachers will go on drilling the students to achieve examination results without any meaningful learning having taken place on the part of the students.

5.4.5 Reduce the rigidity of academic timetable of schools

The activities recommended for promoting higher order thinking skills using ICTs are lengthy and multidisciplinary in nature. The present requirement of rigid forty minutes of teaching subjects in a compartmentalized manner is unsuitable for activities like Projects, Electronic Field trips, and Collaborative learning.

Educational policy makers should give due consideration to this problem and consider a move towards flexibility in the school timetable. The timetable should be designed to incorporate lengthy student activities and also allocate time for student interaction with the teacher for consultation as well as time for teacher to explain guidelines and provide necessary information on student work.

All the recommendations made above can only be realized if there is a conscious effort made by all those involved in education to create a thinking climate for the students. Promoting higher order thinking skills should not only be the responsibility of teachers alone. Parents, educational policy makers and society should also support the educational changes necessary so that our students can face the challenges of the Information age.