

## **A QUALITATIVE STUDY OF PEDAGOGICAL ISSUES ARISING FROM THE INTRODUCTION OF THE MALAYSIAN – SMART SCHOOL INITIATIVE**

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**Abstract:** The Malaysia Smart School initiative began in 1999. The intention was to equip Malaysian schools with an impressive array of information technology (IT) facilities and to bring about associated innovation in teaching and learning as well as to equip Malaysian children with the necessary skills to be effective in a modern society. It was initially beset with difficulties arising from the economic situation in Malaysia. Our research focused on the pedagogical changes which teachers had to bring about and how to enact them. Our approach was to analyse the work of 17 teachers using a qualitative software tool using a literature-based framework of analysis. It was clear from the sample of lessons studied in-depth, that remained constraints on the teacher. There were no accompanying curriculum changes which meant that teachers needed to understand the key purpose of the innovation and should be given the necessary support to enable it to happen.

**Abstrak:** Inisiatif pembentukan Sekolah Bestari di Malaysia bermula dalam tahun 1999. Ia bertujuan untuk melengkapkan sekolah-sekolah di Malaysia dengan kemudahan teknologi maklumat yang baik dan membawa inovasi yang berkaitan dengan proses pengajaran dan pembelajaran seterusnya melengkapkan kanak-kanak di Malaysia dengan kemahiran-kemahiran yang diperlukan supaya lebih efektif dalam masyarakat moden hari ini. Permulaan kajian ini dipenuhi dengan pelbagai masalah yang berpunca daripada situasi ekonomi yang dihadapi oleh Malaysia. Kajian ini berfokus tentang perubahan amalan pedagogi ingin dilaksanakan oleh para guru dan bagaimana untuk menggubalnya. Kajian ini menganalisis 17 orang guru dengan menggunakan peralatan perisian kualitatif berdasarkan rangka kerja analisis literatur. Daripada sampel pengajaran yang dikaji secara mendalam jelaslah bahawa halangan perubahan ini masih berpunca daripada guru. Tidak ada yang mengiringi perubahan kurikulum sedia ada yang mana ia bermaksud guru perlu memahami tujuan utama inovasi ini dan memberi sokongan yang sewajarnya supaya ia dapat dilaksanakan dengan jayanya.

### **INTRODUCTION**

One of the authors of this paper was newly appointed teacher trainer in a Malaysian university at the time when the smart school initiative (SSI) was being

implemented. Since this initiative was likely to cause considerable change in Malaysian schools, she felt that it would be a fascinating area of research in that we were able to reflect how the teachers had adapted their pedagogy to respond to the demands of this initiative.

At the time that our research was conducted (2001), the initiative was at a very early stage. The Malaysian economy prevented the initiative from being fully implemented on real interests were more theoretical and at the same time practical. We were interested in how relevant research helped to understand the changes taking place and also what the implications are for the Multimedia Super Corridor (MSC) which is the Malaysian government's response to the rapid and global growth of information technologies (IT) and the information industries. It was recognized that participation in these world-wide developments requires a supportive education system which develops the necessary skills and attitudes.

Our research in 17 schools taken from the initial 90 schools which started the programme in 1999. In general, our aim was to find out how the teachers had adapted their teaching to accommodate the aims of the initiative (see Section 2) and to relate these changes to research and instructional theories from the literature. Our objectives as stated by the research questions for this study were as follows:

1. How do Malaysian smart school (MSS) teachers employ teaching methods and strategies recommended by the Malaysian Ministry of Education?
2. What are the MSS teachers' opinions about the teaching methods and strategies of the innovation, the new pedagogies and their roles?
3. What are the factors that MSS teachers take into consideration in planning their computer-assisted lesson?
4. How do information and communication technology (ICT) and group work support and promote learning and in making sure this innovation is a success?
5. How do current theories of teaching and learning help us to account for the new pedagogy adopted by the teachers in the context of MSS and ICT-support environment (the word "account" here refers to explain and predict)?

To examine all aspects of pedagogy and pedagogical change involved in such a major innovation would be beyond the scope of our research. The main focus of the research were therefore upon the ways in which the initiative required

teachers to plan and think anew about their teaching and the ways in which they deployed collaborative ICT strategies in their teaching including views and perceptions from teachers, students and the literature. Initially, literatures search revealed few examples of similar innovations across the world. However, there is a strong literature base on aspects of ICT in education, group and collaborative learning, planning and teacher's beliefs, as well as pedagogy in general. This latter literature gave us our framework for analysis and identifies key outcomes of the research.

## **INTRODUCTION TO THE SSI**

The SSI is one of the flag ship applications of the MSC (Curriculum Development Centre, 1999). According to the Malaysian Administrative Modernisation and Management Planning Unit (MAMPU) (2002), the MSS is described as a learning institution reinvented to prepare children for the information age whilst subscribing to the National Philosophy of Education which emphasizes the production of individuals who are "intellectually, spiritually, emotionally and physically balanced and harmonious".

The objectives of the SSI reflect these general aims. They are:

1. To produce a thinking and technology literature workforce
  2. To develop students physically, mentally, emotionally, and spiritually
  3. To provide opportunities to improve individual strength and abilities
  4. To increase stakeholders' involvement
  5. To democratise education
- (MSC, 2001)

The Curriculum Development Centre (1999) emphasises that the MSS pedagogy should seek to make learning more interesting, motivating, stimulating and meaningful; involve the children's minds, spirit and bodies in the learning process; build basic skills to prepare children for greater challenges over time; and to cater for a range of needs and capabilities among the students. The pedagogy should:

1. Use an appropriate mix of learning strategies to ensure mastery of basic competencies and promote holistic development.
2. Accommodate individuals' different learning styles so as to boost performance.

3. Foster a classroom atmosphere that is compatible with different teaching learning strategies.

Traditionally, teaching in Malaysian secondary schools has been what is often referred to as didactic involving an emphasis on whole class teaching with all pupils engaged in the same activity. The SSI therefore represents a major change in approach to pedagogy. In terms of resources, the government planned to implement three levels (Curriculum Development Centre, 1999). The highest level, A consists of 36 classrooms and science labs fully equipped with computers, a computer lab and a much smaller teachers' computer room with 10 computers. Finally, level B has no classrooms or labs equipped with computers, it has a computer lab with 20 computers, a resources center and a teachers' room with five computers.

The first phase of development began in January 1999 and involved in the pilot project schools. The intention was that 10,000 Malaysian schools will be involved by 2010 (Malaysian Ministry of Education, 1997). This initiative, involved both primary and secondary schools, covered four subjects, namely, Science, Mathematics, Bahasa Malaysia and English. The initiative took off in January 1999 with the pilot schools. A cohort of teachers were selected and trained by the Ministry of Education on the aims of the initiative, how to use the resources and teaching methods. This training did have a bearing upon the finding of this research. However, the economic downturn which occurred in 1999 resulted in hardware not being supply to schools concerned planned. Schools employed whatever resources they could hold on to support the initiative. Given this background, it was a tribute to the schools involved that some good progress was made at that time.

At the time of our research, there were a number of teachers in each of the pilot schools who were using ICT in some of their lessons. From our study of 17 lessons taught by different teachers, we noted that they had relatively few computers in each class. The teaching style adopted was group work. Teachers will grouped the students and set group tasks for each group. Some of the group tasks involved using computers. The use of generic packages such as Microsoft PowerPoint and Microsoft Word was to create presentations and task sheet which students worked through. Alternatively, students made use of widely available CD ROM materials and in some cases, the Internet, to carry out searches for information across a wide range of topics. In one case, students had to create a pamphlet using either Microsoft Word or Microsoft PowerPoint depending upon their choice.

## **THEORETICAL FRAMEWORK TO THE RESEARCH**

### **Conceptualising the Change of Pedagogy**

There are a number of frameworks available to support an analysis of our research. However, we found that the most useful analysis is based on either directed instruction or constructivist principles. Neither view is exclusive. In fact, there have been some attempts to reconcile the two approaches (Roblyer, Dozier-Henry, & Burnette, 1996). Directed instruction could be seen as deriving its approach from a behaviourist background where knowledge is viewed as something which is conveyed directly to the learner and the lessons are goal-oriented and structured by teachers (Slavin, 2000). Muijs and Reynolds (2001: 8) add that it should be an active teaching or whole-class teaching method and its approach to instruction is connected to "teaching a small step-practice-review" model. As such, they claim that it is highly effective. Constructivist principles derive from later cognitive thinking about the learning process. The emphasis here is upon the learner's process of constructing their own knowledge through meaningful and authentic experiences (Hackbarth, 1996). The teacher, on this view, is concerned with the understanding on what the child thinks and how she arrives at what she believes. Understanding is fostered through discussion and collaboration with the child encouraged to express her own views better to achieve some meeting of minds with other who may have other views (Bruner, 1999). The two views are summarized in Table 1.

**Table 1.** Summary of teaching and learning approaches

	Directed instruction	Constructivism
View of knowledge	Fixed, codified, "eternal" authoritative, external to student	Internalized, related and linked, situated
View of the learning process	Transmission, acquisition, store and recall, reinforced	Experiential, social contextual
View of the teaching process	Structured, teacher-directed, segmented	Communication, co-operation, scaffolding, managing experience

*Source:* Sharif (2002).

It is our belief that MSS teachers being asked to review their thinking and beliefs about teaching in order to meet the objectives of the initiative. As Malaysian teachers, they work closely to the Malaysian curriculum. This is a highly specified curriculum. Teachers are expected to submit lesson plans which show that they are teaching according to the curriculum. However, the initiative requires teachers to think much more about the processes of learning in order to develop learner's metacognitive skills and values. In our research, we were

interested in how well the above dichotomy of teaching and learning approaches helps us to understand the changes in thinking and beliefs of the teachers.

In reflecting upon this, we were aware that teacher's beliefs are central to innovations in teaching and learning (Fullan & Stiegelbauer, 1991). Teachers base their own thinking and belief systems upon their past experience (Calderhead, 1996). To be a success, the smart school teachers will need to challenge their own beliefs about teaching and adopt new ones. Many of them will not have used ICT before in their teaching. Many will not have used group work. Many will feel a reluctance to relinquish control to learners as they explore, experiment and create with technologies which they, the teachers, barely understand. An in-depth discussion of the theoretical underpinnings to this research are to be found in Sharif (2002).

### **Teacher Planning and Classroom Interaction**

In our research, the planning carried out by teachers does give some indicators of the relationship between teaching intentions, teacher's knowledge and beliefs, and classroom practice. There have been a number of studies into planning and how it influences what happens in the classroom (Clark & Elmore, 1981; Smith & Sendelback, 1979; Carnahan, 1980; Yinger & Hendrick-Lee, 1995). In general, planning has not been an arrangement of resources as opposed to the top down, objectives-based view of planning. This is further discussed in relation to our findings.

### **Approaches of ICT Usage in Learning**

There is an extensive literature on the use ICT for learning. There exist, for example, a wide range of journals in many languages addressing to this topic. For the purposes of our analysis, we were interested in how the teachers used technology to meet learning aims and purposes. A simple analysis of ways of using ICT is presented by Means et al. (1993). In this analysis, applications are classified as (a) tutorial, (b) exploratory, (c) tool, and (d) communication uses. This is similar to the old paradigms described by Kemmis (Wellington, 1985: 59). Essentially, the distinctions are about:

1. Using technology to teach some specific knowledge or skill (tutor) – learning through technology as a medium of instruction.
2. Technology used by learners to model and to explore learning contexts – learning with technology as an aid to thinking.

3. Using technology as a learning support or aid, to reduce inauthentic labour in the learning task – learning with technology as an aid to the task.

It is our view that the SSI requires teachers to use technology principally in the second of the three ways described above. This arises because we view the initiative as requiring the learner to become more creative and autonomous. This is in contrast to the approaches actually used by the teachers.

### **Group Learning**

All the lessons observed involved group work. The interactions with the computer in the lessons involved groups of learners working collaboratively. This is another field in which considerable research has been undertaken particularly by Johnson D. W. and Johnson R. T. (Johnson et al., 1985, 1986). Both authors, and others, are supporters of collaborative learning with computers. Initially, group work was used with computer as a way of ensuring that all children in a class had access to the computer where resources are limited. However, research evidence recognizes the benefits from the collaboration involved. Learners are able to discuss and explain ideas leading to an improvement in their understanding of the nature of the task and the learning outcomes (Loveless, 1995: 113; Underwood, J. D. M. & Underwood, G., 1990: 161). Langhorne et al. (1989: 144) emphasise the way in which members of the group become dependent upon each other's efforts. Research by Hoyles, Healy, and Pozzi (1994) indicated that groups were successful if they were able to develop "a framework of structured interdependence together with individual autonomy". This implies that groups do need to be managed by the teacher to ensure that structures exist within the group for effective working. This involves identifying group co-ordinators, rapporteurs, choosing group members well with clear goals and outcomes. Smart school teachers may well be new to group work. Our research does provide some insights about how they managed them and what believed were the outcomes.

### **RESEARCH METHODS**

In order to address the above questions, it was decided to make use of a case study approach. Yin (1994) supports this view since most of the questions are interpretive and of the "how" form. Seventeen teachers were selected and a single lesson taught by each of these teachers forms one of our cases giving 17 cases in all. The selection of cases was not systematic nor was it intended to be representative of all smart schools. However, the sample did provide valuable insights into the pedagogical change which these teachers were undergoing.

The schools were selected from amongst pilot secondary smart schools in one region of Malaysian – Sabah. This was principally for reasons of accessibility. It also meant that the schools selected were not amongst the most advanced smart schools. Six schools in all provided the case studies. Each teacher provided lesson paperwork and materials. In addition, structured interviews were conducted with each teacher and with the groups of students in the lessons observed. The lessons were observed and key incidents were recorded on video. However, observational studies were only used to confirm that the lesson had been conducted according to the plan.

Research of this kind generates a large amount of data. The software used in this research was NVIVO<sup>1</sup>. This package has been designed with Grounded Theory in mind (Strauss & Corbin, 1990). The Grounded Theory approach ensures that theories emerge from the data. It is particularly suited to situations where there are no pre-existent theories. However, we felt that our area of research was rich in theory. NVIVO was therefore, used in the early stages of analysis but the main categories of analysis were predetermined by the smart school aims and the theoretical perspectives which we identified from the literature. We found that this approach worked very well. We were able to make use of the smart school aims and the literature to guide our thinking in terms of the research design and the overall direction of the analysis. However, we were able to let the data from the teachers and the students "speak for itself" in that we allowed the lower level categories and concepts to emerge naturally from the data.

### **Method of Analysis**

The data from interviews with the teachers and students was subjected to detail analysis using NVIVO. This involved labeling and categorizing the phenomena in the data. This process produces "concepts" in this form of analysis. Grounded Theory refers to this as "open coding" (Strauss & Corbin, 1994). As the data is labeled in this way, qualifiers can be used to indicate the context or conditions in which the particular phenomenon is labeled. At the next level, the labels or "concepts" are grouped together to form what are referred to as "categories". The categories themselves are then grouped into a tree structure. The structures emerging from this research are described in the next section. This process is repeated across the different case studies until a state of saturation is achieved where further analysis produces no or minimal changes to the existing concepts and categories.

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<sup>1</sup> NVIVO is produced by QSR International Pty. Ltd. 2<sup>nd</sup> Floor, 651 Doncaster Road. Doncaster, Victoria. 3108, Australia. <http://www.qsr-software.com/>.



The next stage in Grounded Theory is to develop these categories into novel theoretical models. Based on our belief that this area of research is rich in the theoretical ideas as in the literature in order to develop an understanding of the changes in pedagogical practice employed by the teachers.

### Development of the Categories

The categories used to analyse the data are summarized in Tables 2–4.

**Table 2.** Categories emerging concerning beliefs about planning

Planning	Taking into account the needs of the student	Student's level of knowledge and understanding of subject and ICT
	*	Student's attitudes and inclinations towards ICT
	Analysis of the activities of the lesson in terms of curriculum and objectives	Time in terms of lesson length
		Syllabus or topic which must be taught
	The role of the teacher as planner	How teachers go about the planning process
How teachers address their wider social roles		

*Note:* Table 5 shows how the data was analysed for the element of the table indicated by a \*

**Table 3.** Categories emerging concerning beliefs about ICT

ICT	Advantages of using ICT in the classroom	Advantages to teachers: facilitates teaching through preparation of materials and in-classroom support
		Advantages of ICT as a medium: colourful, interactive, animated, information source
		Advantages to students in that it helps meet learning objectives and develops ICT skills
	Challenges to teachers and students in using ICT in the classroom	Teacher's lack of ICT skills and how to use ICT in the classroom
		Student's lack of ICT skills and also their command of English
		Lack of appropriate ICT resources in terms of quantity and quality
	When and when not to use ICT in the classroom	ICT should be used where it can meet lesson objectives

**Table 4.** Categories emerging concerning beliefs about ICT

Group Work	Advantages	It helps the teacher achieve objectives through shortening task time, sharing of tasks and ideas
		It helps students learn through interaction with peers and develop skills of collaboration
	Challenges	Teacher found group work noisy and also difficult to plan suitable activities; some activities took longer in groups
		Individual students may dominate groups or not participate
Organisation	Groups should be carefully organized in terms of membership (friends, gender, ability)	

**Table 5.** Analysis of statements made by teachers about planning

Statements	Concepts	Subcategory
1(a) Then we look at the <b>students' ability...</b> only one or two students who are really <b>expert</b> in using the ICT ... the students' <b>prerequisite knowledge...</b>	Skills & knowledge	Students' Analysis
(b) The students are <b>aggressive and independent.</b>	Attitude	
2. ...but we also have to concentrate on <b>weak students.</b>	Skills & knowledge	
3. ...a result of <b>previous knowledge</b> mix or add with what they've learnt... and the <b>skill to use technology...</b>	Skills & knowledge	
4. ...they <b>need</b> more than one activity as some of them can finish it faster.... It's according to the <b>students' pace....</b> If we force it, we still couldn't get it.	Skills & knowledge	
7. First, the <b>skill</b> in using ICT we must make sure that our <b>students are skilful</b> enough to use ICT...	Skills & knowledge	
8. It depends on the syllabus and the students; their <b>abilities and existing knowledge...</b>	Skills & knowledge	
13. They've just undergone their monthly mark test and sad to say that only few of them just above the pass mark.	Skills & knowledge	
14. ...I always think about the <b>students and their comments</b> on the activities.	Attitude	

*Note:* The number refers to the particular teacher. "Students' Analysis" to "taking into account the needs of the student". See Table 2.

The above findings were obtained through coding the data and then drawing the various coding together. Three main categories were identified. This identification was guided by the aims of the SSI and the research aims. They

were statements relating to Planning, ICT and Group Work. Under each of these headings, further subcategories were identified from the data. These subcategories are contained in the second column. The concepts arise directly from the coding of the data were a number of statements providing the evidence base for each concept.

An example of the process is shown in Table 5. This shows the marking (in bold) of statements made by teachers regarding their planning. The table shows how these statements then relate to the concepts and subcategory related to meeting students' needs.

Categories emerging from the teachers' interviews were used to analyse the student interviews. This enabled comparisons to be made between students and teachers data.

## **RESULTS AND DISCUSSION**

In general, the findings supported the literature. This was comforting given that most of the research into teaching and learning, particularly with ICT, has been carried out in developed countries (Western). It does support the notion that theories emerging from research will have broad applicability. However, in our research, there were cultural influences which had a noticeable impact. Values such as collectivism and respect are part of the Malaysian culture (Tayeb, 1996) as opposes to the more individualistic value systems operating in the West. It was felt that these values did ease the process of change through a willingness to conform. These factors applied not only to the teachers but also to the students who have great respect for their teachers. This point will be developed later.

Interviews with the teachers and the students both demonstrated positive attitudes towards the new strategies and methods advocated by the innovation. Positive attitudes could also be seen during the classroom observations, where the teachers demonstrated a full commitment to the new styles of teaching. It was also clear that the teachers put more effort into their planning and were trying very hard to make the innovation work.

It was also clear from the interviews with the teachers that the training courses were very influential. The teachers were introduced to the new approaches in the practically oriented training courses. The courses involved production of materials which were used in some of the lessons observed. It was evident from the interviews with the teachers that the teachers were aware of the methods which they were expected to employ and the aims and purpose of the innovation. What appeared to be lacking was an understanding of the underlying theory and

research evidence concerning the new teaching approaches. This left the teachers with the task of discovering for themselves effective ways of managing groups learning with and management. Using ICT does affect the nature and structure of classroom communication and the scheduling of activities. Bennett (1994) points out that the "single-shot" in service courses are often ineffective and advocates longer terms perspective.

### **Lesson Plan**

The teachers had to plan lessons to meet two agendas. They were required to follow the Malaysian National Curriculum and demonstrate this through plans submitted to the school management. They also had to plan to meet the requirements of the initiative. This involved a heavy burden of preparing group activities in which perhaps only one or two of the groups made use of computers. This required planning of different and relevant group activities for the other students. The complexities of this task emerged from the teachers; interviews.

Analysis of the lesson plans showed that, in practice, the teachers planned their lessons so as to give a framework for the instruction, organize students and find a sense of direction. For example, all teachers observed were seen using the same lesson framework, which begins with the introduction phase, followed by the instruction phase and assessment phase. The classroom observation data and also literature (Zahorik, 1975) support the idea that planning only serves as a rough guideline for teachers and teachers do not always follow it linearly.

In our research, we were interested in the quality of lesson plans employed and designed so as to achieve MSS objectives, which intend to move from didactic exposure to seeing students as thinkers. The classroom observation data and lesson plan analysis revealed that the activities designed were merely drill and practice, and computers were frequently used effectively as tutors. These types of activities would involve only basic IT skills with little opportunity to develop students' ICT skills. This was largely dictated by the variable IT skill levels of the students. It was also determined by the teachers' own lack of understanding of the ways in which ICT could be used to enhance SSI aims. This was reflected in planning paperwork where the SSI objectives were seldom mentioned by the teachers showing that they emphasized on achieving curriculum objectives and less emphasis was given to promote the new skills promoted by the MSS innovation.

As pointed out above, planning took considerably more time compare to non-SSI lessons. Planning need skills in preparing materials (e.g., Microsoft PowerPoint presentation). It had to take into account the variable ICT skills of the students – some students had previous ICT training while others do not. Consequently,

activities tended to assume minimal ICT skills. "Circus" type organization was employed with one or two stations being computer based. This placed additional planning burdens upon the teachers in order to ensure that activities were relevant to the curriculum for all the groups. Interview data did reveal that the teachers were aware of their changing role and saw themselves more as facilitators of learning. Some even commented that ICT could make the process of planning easier through easier production of materials which once prepared could be left to the students to use with less demands on the teacher.

### **Role of ICT in SSI**

Both the teachers and the students were very positive about ICT. Firstly, the students were attracted to ICT features that could not be found in any other media. In the students' interviews, they said that ICT motivate them and engaging them in the learning process. Students' motivation can be seen through the classroom dynamic, including interaction among students, teachers and technology. In addition, the students claimed that ICT can cater to their learning needs, for example, in improving their understanding of the subject, especially in understanding difficult concepts and complex terms and gave the opportunity to learn at their own pace. Furthermore, they believed that ICT was a symbol of progress in education and they would be using ICT in their further life.

During the interview with teachers, only one teacher mentioned that ICT could improve students' achievement. This was the only teacher that had seen progress in her students; she also had the most experience teaching with ICT compared to other teachers. This highlights a key issue. Teachers always claim that ICT helps learning through evidence based on aspects such as motivation, but there is little evidence to improved in test or exam results with the assistance of ICT .

Teachers claimed that ICT required them to move away from the more traditional didactic styles of teaching. It also gave them more time for students with learning difficulties and gave students freedom to learn independently. This evidence must be set alongside the kinds of ICT activities which the teachers actually used. Only one teacher used ICT creatively, most used was drill or computers were used not aware of the full range of ways of using computers in the classrooms and lacked knowledge of the types of programs and materials that would develop the skills proposed by the SSI. A further limitation was that most of their softwares were in English. This compounded difficulties encountered by the students in making full use of the software available.

This supports the view expressed by Dwyer, Ringstaff, and Sanholtz (1990: 9) that simply having access to ICT is not enough in terms of affecting students'

learning. Merely employing ICT and providing resources does not necessarily result in effective use of the resource.

### **Analysis of Group Work Conducted**

The other major pedagogical strategy emphasized in SSI classrooms was group work in order to promote creative and critical thinking amongst students. ICT was always seen being used in a group context.

Both teachers and students identified the promotion of learning and social skills as important purposes for using group work. For the teachers, the main reason why group work was used was the opportunity it gave for students to discuss with friends, and to promote active learning. For the students, the most significant response was the opportunity to discuss and help their peers and be helped by their more knowledgeable peer in which complex tasks can be mediated. Classroom observation confirmed that the students actively participated in group work and were seen to be helping and supporting each other. The students were found to be actively communicating their ideas, discussing and negotiating to maximize and enhance learning. As noted by Hooper and Hannafin (1991), group work encourages collaboration and allows revising and confirmation of understanding which are important for in-depth learning and creative and critical thinking. During this process, the students have the opportunity to negotiate and build a shared knowledge base through the actions of explaining their ideas and thoughts. The data also revealed the importance of a team spirit amongst students and having a sense of value in helping each other to perform at their best for their own group. All these are mentioned in the literature especially in terms of promoting understanding, co-operation, independent learning, peer tutoring, discussion and other social skills (Mc Manus & Gettinger, 1996; Loveless, 1995: 79). Other advantages mentioned by the teachers in the interviews were that group work was the effective way to do some learning tasks, such as projects and in problem solving contexts; it was also an efficient way of making use of limited resources.

Group work has its own disadvantages. In the students' interviews they noted that they did not like it when there was lots of noise. Younger students in lower ability groups stated that they felt less comfortable learning with their peers. The students also noted that there was the possibility of dominance of groups in which only a few students accomplish the task while others are passive. Computer activities are prone to this disadvantage where one member they believe that the success of group work depends on the type of the students, classroom organization and students' willingness and effort to co-operate as well as willingness to receive guidance and help (Sellinger, 1999: 44–45). Marcovitz, Hamza and Farrow (2000), and Chin and Carroll (2000) add that sometimes

intervention by the teacher could cause more problems than solving them because student collaboration is complex operating, at different levels and changing their roles from information provider in a didactic exposition to facilitators in a more constructive exposition. Consequently, the teacher were discovering that group work does need effective management by the teacher (Hoyles, 1994).

The combination group work and ICT was supported both by the teachers and the students. In both the students and teachers' interviews, most of the students and teachers indicated that they preferred to use ICT and group work together where they believed that effective learning with ICT was enhanced. The students' willingness to co-operate and help each other was seen as the most important factor in promoting these two teaching strategies in supporting learning. The literature does broadly support these views. Advantages of using ICT in combination with group work can be seen to promote cognitive achievement (Hooper & Hannafin, 1988; Johnson et al., 1986; Simsek & Hooper, 1992; Yu, 1998), and effective and social achievement (Hooper, 1992; Repman, Welter & Lan, 1993; Johnson et al., 1986; Kutnick & Marshall, 1993). However, academic achievement was rarely mentioned by teachers and students as an advantage, probably because the project had just started and no formal assessment had been done on the students' achievement.

## **CONCLUSIONS**

This research was conducted at an early stage in the development of the SSI at a time of difficulty in its progress arising from lack of funding due to the economic situation in Malaysia. However, an effective start appears to have been made. Our interests were really pedagogical in that we were identifying the pedagogical changes which the teachers were undertaking and relating these changes to the theoretical frameworks already in existence in the literature. Despite the setbacks, our research shows that aspects of the initiative were effective. The teachers whom we studied were not the leading practitioners in the leading schools. But we did see evidence of evolving and developing practice with IT in order to meet the aims of the SSI. Teachers were organizing students into groups who were making use of ICT in a collaborative fashion.

The preparation and training had affected the teachers' practice and there were clear signs of commitment and motivation towards SSI by both the teachers and the students. In common with many initiatives of this kind, the teachers were left to develop the strategies for themselves and lacked a clear understanding of the theoretical basis of the new teaching and learning methods they were being expected to employ. From our examination of the teachers' planning, there was a clear evidence of a change in thinking about the planning process. The research

showed that factors such as level of ICT competence, learning intentions with the ICT, and organization and management of group activities have to be included in teacher's thinking about their SSI lessons.

If the objectives of the Malaysian SSI are to be met, teachers will have to re-conceptualise their thinking about the teaching and learning process. This should be within a theoretical framework which provides insight into the kinds of pedagogy which are appropriate to meet these objectives. If SSI teachers are to promote thinking skills, and to democratize education, we believe that the teachers will have to adopt more constructivist views about the learning process. New pedagogies emerging from such thinking and beliefs need also to be supported by the systems and organizations in which the teachers operate. Otherwise, initiatives can be undermined by requirements to adhere to systems and procedures. There clearly are lessons here for this initiative and similar initiatives. These lessons relate to the need for training which is both on-going and also theoretically sound. Resources need to match the ambitions of the initiative. Finally, school systems and requirements need to be supportive of such initiatives if the enthusiasm of teachers and pupils is to be translated into meaningful change.

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