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An Evaluation of the Smart School Teacher Training Programme and its Impact on Integrating Technology into Teaching and Learning Processes in Malaysia

ABSTRACT

The aim of this study was to evaluate the effectiveness of conducting the 14 weeks In-Service (INSET) Course for the training of Smart School teachers, which was conducted by the Teacher Education Division, Ministry of Education, Malaysia and the In-House Training at the school levels. Questionnaires were administered to a total of 882 teachers and 2,689 students from 70 Smart Schools in Malaysia. The main findings from this study showed that teachers who had attended the courses had acquired all aspects of Smart School teaching and learning strategies which comprised of acquiring the concept, planning the Smart teaching, the Smart School teaching and learning processes, management of Smart classes except the Smart School assessment and evaluation techniques. In implementing the Smart School programme at their respective schools, teachers were facing numerous constraints which included heavy work load, insufficient funds, examination forces, time management, syllabi demands, empowerment aspect, receiving different directives from different superiors, students' factors, inadequate help from colleagues and supports from their superiors. In spite of that, 82.8% of the respondents admitted that they still implemented the Smart School programmes and conducted In-House trainings for other teachers at their respective schools.

Key words: *smart school, teacher training programme, in-house training, and teachers' competences in Malaysia.*

INTRODUCTION

Smart Schools represent one of the seven Flagship Applications of the Multimedia Corridor. Smart Schools are not only intended to produce knowledge workers who possess the requisite technological skills but also aim to inculcate critical thinking skills through intelligent learning consistent with the tenets of the National Education Philosophy.

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A Smart School is an educational establishment that adopts instructional processes and educational management practices that foster systemic changes that are intended to enable learners to surmount the challenges posed by the information technology era. The Smart Schools Pilot Project was implemented in 90 schools nation-wide, comprising nine new schools (five primary and 4 secondary) and 81 existing secondary schools.

Beginning in 1998, the Teacher Education Division of the Ministry of Education in Malaysia was charged with the task of training teachers for the Smart Schools Programme. The effective training of teachers for these Smart Schools is a key factor impacting on the success of the Programme. A 14-week INSET Course for Training Smart School Teachers was conducted in selected teacher training colleges/institutions in order to fulfill the staffing needs of Smart Schools. Teachers specializing in the teaching of the Malay language, English, Science and Mathematics participated in this course.

AIMS AND OBJECTIVES OF TRAINING SMART SCHOOL TEACHERS

The training of Smart School teachers was aimed at enhancing their professional skills of facilitating learning and fostering innovation so as to optimize instruction through the integration of technology. The training provided to Smart School teachers was intended to enable them to: (1) plan and develop instructional packages that fulfilled the requirements of the Smart Schools curriculum; (2) facilitate and manage learner-centered instructional environments through the application of a variety of innovative and creative strategies; (3) apply and integrate technological applications such as multimedia, Internet and Digital Communications in the instructional process; and (4) manage classrooms equipped with multimedia technology facilities.

In other words, this training course was intended to: (1) prepare teachers to confront the challenges posed by the advent of the latest educational innovations in Malaysia and in the world at large; (2) develop intellectual capabilities that encourage teachers to reflect on their practices so as to surmount the challenges of the Information Technology Era in a manner consistent with the aims of teacher training for Smart Schools; (3) nurture teachers' professional skills to enable them to utilize technological innovations and provide instruction that is intended to develop knowledge workers of world standard; (4) enhance the use of technology in smart learning environments in order to improve teaching and learning processes; (5) inculcate positive attitudes and values that will meet the challenges and demands of the Information Technology Era; (6) enhance collegial ties and facilitate reciprocal professional development so as to support and sustain the implementation of Smart Education Programmes; and (7) inculcate an appreciation for, and practice of life–long education (Ministry of Education Malaysia, 1998).

By experiencing the process of preparing instructional packages, it is intended that course participants will able to: (1) understand and appreciate the teaching – learning concepts that need to be implemented in Smart Schools;

(2) enhance their understanding of smart school skills so as to improve their professionalism; (3) translate the specifications of the Smart Schools curriculum into teaching – learning resources; (4) apply the knowledge and expertise that they have acquired from the course in planning and implementing smart instructional learning practices; and (5) develop instructional modules infused with smart learning features for use in simulations and practicums (Ministry of Education Malaysia, 1999).

COMPONENTS OF THE CURRICULUM FOR THE 14-WEEK INSET COURSE FOR THE TRAINING OF SMART SCHOOL TEACHERS

Table 1 shows the components comprising the curriculum for the 14-week INSET Course for the Training of Smart Schools Teachers, as follows:

Component	Content	Week	Hours
FOUNDATION 41.4% (126 hours)	A. Introduction: 1. The Concept of Smart School. 2. Managing Change.	 1 1 & 2	 6 10
	B. Generic Skills: 3. Assessment and Evaluation Skills. 4. Critical & Creative Thinking Skills. 5. Information Technology Skills. 6. Study Skills.	 1 – 6 3 – 7 1 – 9 4 , 9 – 10	 20 20 60 10
PEDAGOGY 58.6% (178 hours)	C. Learning Organization: 7. Smart School Curriculum Specifications. 8. Organization of Smart Learning.	 1 – 2 1 – 10	 14 50
	D. Practice of Smart Learning: 9. Learning Packages. 10. Simulations. 11. Practicum.	 1 – 10 5 – 10 11 - 14	 20 30 64
	E. Organization of Participants		1
	Total	**14**	**305**

The curriculum for the 14-week INSET Course for the Training of Smart Schools Teachers comprises 5 components, as follows:

i.	Introduction	16 hours
ii.	Generic Skills	110 hours
iii.	Learning Organization	64 hours
iv.	Practice Of Smart Learning	114 hours
v.	Organization of Participants	1 hour
Total		**305 hours**

In order to implement Smart School instruction, course participants are required to master the four sets of skills follow: (1) Assessment and Evaluation Skills; (2) Critical and Creative Thinking Skills; (3) Information Technology Skills; and (4) Study Skills.

BACKGROUND TO THE STUDY, SAMPLING PROCEDURES AND AIMS OF THE STUDY

This paper presents the findings of a study conducted by a research team that was a part of the "Fast Track" research project. The Faculty of Education of the National University of Malaysia conducted a series of studies that investigated the effectiveness of training programmes intended to train Smart School teachers and evaluated their impact on student learning. The data for this study was collected through a questionnaire that was administered to 882 Smart School teachers. 411 of these teachers attended a 14-week INSET Course for the Training of Smart Schools Teachers at teacher training colleges/ institutions while the remaining 471 teachers attended In-house courses in their respective schools. The questionnaire was also administered to 2,689 students in 70 Smart Schools throughout Malaysia.

This study evaluated the effectiveness of the 14-week INSET Course for the Training of Smart School Teachers as well as In-house Courses. Data pertaining to the effectiveness in implementing smart school instructional practices was collected from teachers who had attended these courses. The findings of this study are intended to allow those planning and implementing the Smart School teacher education programme to enhance the quality of their training programmes. The study is also intended to investigate the impact of these courses on the students in Smart Schools.

THEORETICAL FRAMEWORK

There are a number of evaluation models have been developed that can be used to evaluate any educational programme. Among them are *Portrayal Model* (Stake, 1983); *Adversary* (Wolf, 1983); *Utilization* (Patton, 1978); *Investigative Journalism* (Guba, 1981); *Goal-Freee* (Scriven, 1973); *Modus Operandi* (Scriven, 1974); *Connoisseurial* (Eisner, 1983); *CIPP* (Stafflebeam *et al.,* 1971); *Objective Based* (Tyler, 1983); and *Cost-Effectiveness* (Smith & Hauer, 1990).

The CIPP Evaluation Model has been used to construct the conceptual framework for this study. The usage of the CIPP Evaluation Model in this study is in accordance with the operational definition of evaluation as defined by Stufflebeam et al. (1971), that is, evaluation is the process of delineating, obtaining and providing useful information for judging decision alternatives. The CIPP Evaluation Model is considered as the most suitable model that can be used in this study because it explains how it can evaluate the quality of the programme for the purpose of further improvement.

According to Stufflebeam *et al.* (1971), there are four stages of decision-making: (1) decision on *contexts;* (2) decision on *input*; (3) decision on *process;* and (4) decision on *product.* Evaluation of *contexts* will focus on the environment where changes will determine the problem of the environment. Evaluation of *input* will focus on the resources available for decision making on how to achieve certain goals and objectives of a programme. Evaluation of *process* will be focusing on the process used to achieve certain goals and objectives of a

programme. Feedback should be available at all times in order to control the implementation of the programme. Lastly, evaluation of *product* will focus on the outcome of the programme after it had been successfully implemented. The CIPP Evaluation Model will definitely help in planning decision, structuring decision, implementing decision and recycling decision of the Malaysian Smart School Programme.

Owen (1998), in his *Sociotechnic Systems Theory*, suggests that the four internal factors of any organization, namely task, structure, technology and human, are very interactive and interdependent. A change in any one of these factors will trigger a change in the other three factors. Hence, in the context of Malaysian Smart Schools, there is a change in the task of the teachers (implementation of Computer Integration) supported by the change in technology.

RESEARCH INSTRUMENT, ANALYSIS OF THE DATA AND SIGNIFICANCE OF THE STUDY

Two instruments were used in the collection of data for this study. One instrument was administered to the teachers and another was administered to the students. The research team developed both instruments. The **Questionnaire for Teachers** comprised three sections. Section A comprised 14 items that were intended to collect data pertaining to the demographic composition of the respondents. Section B of the questionnaire focused on the respondents' mastery of key smart learning concepts upon completion of the 14-week INSET Course for the Training of Smart School Teachers as well as In-House Courses in Smart Schools. Section C of the questionnaire comprised 13 items that were intended to collect data pertaining to the degree to which respondents were able to apply the knowledge that they had acquired from the course that they had attended.

The **Questionnaire for Students** also comprised three sections. Section A comprised 5 items that were intended to obtain the demographic data of the respondents. Section B comprised 32 items related to smart instructional strategies and processes, classroom management, and assessment and evaluation. Section C of the questionnaire contained 12 items that focused on the use of the internet and smart instruction. Being a national study, it was decided that a survey design should suffice to answer the research questions.

The data obtained through these two instruments was analyzed using the SPSS data analysis software. Frequencies, percentages, means, standard deviations and t-tests were computed.

The present study is significant for a number of reasons. The investigation of the effectiveness of the 14-week INSET Course for the Training of Smart Schools Teachers yielded data that can be used to improve the quality of the course as well as the components comprising it. The study gauged the participants' perceptions of the quality of the course that they had attended as well as the extent to which they perceived that the course had assisted them in implementing smart instructional practices in their respective schools. All

course participants were also required to conduct in-house training sessions for their peers. The study offers insights into the extent to which course participants were able to conduct such in-house training. The findings of the study have the potential of providing valuable input to the course developers in their review and reformulation of the course curriculum. More specifically, the findings of the study have the potential of enabling the Teacher Education Division to enhance the quality of its training programme in order to develop smart school teachers who are adept in smart instructional procedures and are, consequently, capable of assisting in the realization of the concept of smart learning.

The findings of the study also have the potential of assisting Smart School heads in implementing smart instructional procedures in their respective schools. The findings of the study can also assist the District Education Officers in assigning staff to Smart Schools as well as in providing more relevant and effective courses in the Teacher Resource Centers in their respective school districts.

The findings of the study will also, to some extent, assist the State Education Departments in their planning, management and implementation of Smart Schools in their respective states. The data obtained from this study can also assist the Curriculum Development Center in providing pertinent training to school heads that will enable them to plan, manage and implement the Smart School curriculum more effectively. The findings of the study can also assist institutions of higher learning in updating their respective teacher education programmes as well ensuring that these programmes are consistent with the smart instructional procedures implemented in Smart Schools.

RESEARCH QUESTIONS AND LIMITATION OF THE STUDY

The collection of data in the study was guided by the following research questions.

First, for **Smart School Teachers:** (1) What were the demographic characteristics of the teachers attending the 14-week INSET Course for the Training of Smart School Teachers and In-house Courses in Smart Schools?; (2) To what extent did the 14-week INSET Course for the Training of Smart Schools Teachers and In-house Courses in Smart Schools assist in enhancing the participants' knowledge and skills in the following aspects: general smart learning concepts, planning of smart learning activities, smart instructional processes, management of smart learning classrooms, and assessment and evaluation of smart learning?; (3) To what extent did the 14-week INSET Course for the Training of Smart School Teachers and In-house Courses in Smart Schools equip the participants with the knowledge and skills necessary for implementing smart instructional procedures in their respective schools?; (4) To what extent were teachers able to apply the knowledge and skills that they had acquired from the 14-week INSET Course for the Training of Smart Schools Teachers and In-house Courses in Smart Schools?; and (5) Was there a difference between the participants of the 14-week INSET Course for the

Training of Smart School Teachers and the participants of In-house Courses in Smart Schools in terms of the extent to which they were able to acquire a knowledge of and expertise in smart learning concepts, planning smart learning activities, implementation of smart teaching – learning processes, management of smart classrooms, and assessment and evaluation of smart learning?

Second, for **Smart School Learners:** (1) What were the demographic characteristics of Smart School learners?; (2) How did the learners respond to the smart teaching – learning activities conducted by smart school teachers?; (3) How did the learners respond to the use of the Internet in instruction?; (4) How did the learners respond to smart learning?; and (5) Was there a difference between male and female learners in their responses to the use of smart teaching – learning strategies, the use of smart teaching – learning materials, management of smart classrooms, smart learning assessment and evaluation procedures, the use of the Internet, and smart learning?

The study only involved 70 government funded Secondary Smart Schools in Malaysia. The second limitation of the study is related to the administration of survey questionnaires to smart school teachers and pupils. In this regard, the issue of response bias might be of concern. Nonetheless, it was felt that biases, in the form of *misreporting*, *motivational states*, **or** *activation of response sets,* as pointed out by Braverman (1996), are minimal.

LITERATURE REVIEW

A number of studies of smart schools have been carried out. Most of these studies have investigated the effectiveness of the programmes developed for training smart school teachers as well as the extent to which smart instructional procedures have been implemented in the pilot Smart Schools throughout Malaysia.

In his investigation of Malay language teachers' perceptions of the Training Course for Smart School Teachers, Mazlan A. Aziz (1999) found that these teachers had a good understanding of the aims and objectives of the training course. However, these teachers also felt that several aspects of the course, such as information technology skills, preparation of instructional packages and simulations using these instructional packages, were adequate. The training course did, however, succeed in exposing teachers to the key concepts of Smart Schools and also served to motivate them in their teaching.

Zainal Abidin Hassan (1999) investigated the teaching and learning of the Malay language in two Smart Schools in Johore state. His respondents were 60 Fourth Form students. The findings of his study indicated that students were very interested in, and motivated by, computer-assisted learning and Internet-based materials. Teachers also had a positive attitude towards the use of Internet-based learning materials. However, students' as well as teachers' mastery of the Internet was poor. These findings are consistent with those from the study by Jamaluddin Badusah (1996) who asserts that the computer can assist the teacher but not replace her. The computer should be viewed as an

effective tool that can assist and complement the teacher.

Arniza Mokhtar (2001) investigated the problems related to the implementation of smart instructional strategies in the teaching of the Malay language in Negeri Sembilan state. The study investigated how teachers perceived the implementation of several aspects of smart instruction, including pedagogical skills, instructional activities, integration of skills and infusion of content from other subject areas as well as the use of information technology in teaching. Several problems pertaining to the implementation of smart instruction were also investigated, including the resource center, classroom organization, learner attitudes, knowledge and skills as well as the impact of the school administrative system. The sample for the study comprised 62 Malay language teachers from six Smart Schools in Negeri Sembilan state. A questionnaire was used in the collection of the data. The findings indicated that, as a whole, teachers often used appropriate pedagogy and instructional activities. They also integrated skills and infused content from other subject areas but seldom used information technology in their teaching. A t-test indicated that there was no significant difference in the application of Malay language teaching strategies by teachers who had undergone smart instruction training and those who had not. The t-test indicated, however, that a significant difference existed between teachers teaching in residential schools and those teaching in day schools in their implementation of various Malay language teaching strategies other than the integration of skills and the infusion of content. A large proportion of teachers also reported that they encountered problems in the implementation of various Malay language teaching strategies.

Lee Lai Guan *et al.* (1998) conducted a study that evaluated the effectiveness of the implementation of a 14-week INSET Course for the Training of Smart Schools Teachers. The findings indicated that a majority of the participants were satisfied with the implementation of the different aspects of the course curriculum. Nonetheless, a sizeable proportion of the participants indicated that they were dissatisfied with the presentation skills of several of the course facilitators, the duration of the course, the sequencing of the course topics and the equipment available in the schools where they had carried out their teaching practicum. The main difficulties reported by the respondents were their inability to master information technology skills, inadequate finance, difficulty in developing instructional packages and the inability to infuse the generic skills into their instruction during the practicum.

Lee Lai Guan *et al.* (2000) followed-up with another study in the pilot Smart Schools in Kedah and Perlis states. This study attempted to investigate the extent to which smart learning elements were infused into the following aspects of the instructional process: (1) assessment and evaluation skills; (2) study skills; (3) critical and creative thinking skills; (4) managing smart instruction; and (5) information technology skills. Other aspects of the smart instructional process that were investigated included: (1) the extent to which information technology skills were utilized; (2) availability of technological equipment and facilities for

smart learning; and (3) the problems encountered by teachers in implementing instructional activities.

The data for the study was obtained through the use of a questionnaire as well as interviews with 40 teachers who had undergone the 14-week INSET Course for the Training of Smart Schools Teachers, from eight pilot Smart Schools in Kedah and Perlis states. The findings indicated that many teachers were only occasionally able to apply the different skills except for information technology skills. The findings also indicated that many teachers were unable to reap the full benefits of infusing information technology into the instructional process. It was also found that information technology facilities for smart teaching and learning were lacking in many schools. The main problems reported by the respondents were the negative impact of the examination-oriented school curriculum, the immense effort expended on preparing instructional materials and activities, the lack of existing instructional packages that could serve as exemplars, and the effort required to adapt existing instructional packages to meet classroom needs.

Nik Zaharah Nik Yaacob (2000), in her study of the role of a principal in the management of information technology resources in a Smart School in Kelantan state, found that the principal adopted a supportive and success-oriented leadership style in the management of information technology resources. The efforts of the principal had resulted in 80% of the teaching and support staff being computer literate. The staff also applied these skills in performing their jobs. As well, 67.5% of 200 students from this school had acquired computer literacy skills as a consequence of engaging in the instructional activities conducted in the school.

Siti Junaidah (1999) conducted a study that was intended to identify and understand teachers' mindsets and their perceptions of the Smart School programme. The teachers' mindsets were investigated by deploying two of the dimensions of the Model of Four Mindsets, that is, level of attainment and level of satisfaction. Questionnaires as well as interviews were used to collect data from 120 teachers in Dengkil National School and Dengkil National Secondary School in Kuala Langat district. The findings indicated that almost all the teachers in the two schools had a positive perception of the Smart School project. However, only 53.3% of these teachers had a clear understanding of the concept of a smart school. For the two dimensions of the mindsets of the respondents, 87.5% of the teachers had a high attainment level while 95% had a high satisfaction level. Based on these findings, it was recommended that various initiatives be undertaken to reduce satisfaction levels while raising attainment levels so that the teachers' mindsets could be changed to foster positive and productive attitudes and actions as well as to encourage teachers to be more proactive.

The study by Siti Suria Salim (2001) attempted to investigate smart school teachers' understanding of and preparedness for change. The data, obtained from a questionnaire administered to 45 smart school teachers in Selangor

state, showed that the teachers understood the aims of changes arising from smart instructional procedures. Nevertheless, these teachers reported that their implementation of smart instructional processes was only at a moderate level. It was found that 75.5% of the respondents persisted in using conventional teaching techniques. The study also indicated that there was a significant relationship between the teachers' understanding of and their preparedness to confront change. Among the constraints reported by the teachers in their attempts to implement changes in their instructional techniques were inadequate training, insufficient equipment and lack of support from parents. Around 73.3% of the respondents indicated their dissatisfaction with the failure of their respective principals to provide adequate support and assistance in implementing smart instructional procedures. Around 51.1% of the respondents were only somewhat prepared to use computers.

Of those respondents who had attended Smart School training courses, 60% indicated that they were not satisfied with the explanations provided of the aims and objectives of the instructional changes. Around 84.4% of the respondents expressed their dissatisfaction with the financial resources that were provided to upgrade and maintain computer equipment. Another 91.1% were dissatisfied with the software that had been provided. The study also found that the problems of time constraints as well as the heavy workloads that teachers shouldered could be alleviated by a supportive school administration. Also, around 84.4% of the respondents were dissatisfied with the level of support offered by parents in the implementation of the activities organized by the school. Other problems and needs included training in instructional techniques, information technology courses, inadequate supervision and monitoring of the implementation of smart instructional procedures and large student enrolments.

Sathismoorthy Kannan (2001) had conducted a study which focused on the identification of Stages of Concern (SoC), Levels of Use (LoU) and the Managing Ability of the Integration of Computer into Teaching-Learning (Computer Integration) among the Smart School teachers. A sample of 74 teachers (28 men and 46 women) from 12 Smart Schools across the country participated in this study. Three instruments, namely the Stages of Concern Questionnaire, the Managing Ability Questionnaire and the Levels of Use Interview, were administered to collect sufficient data from the sample. The major findings suggest that the Smart School teachers were experiencing intense *self* and *task* concerns with respect to Computer Integration. The most intense concern among the Smart School teachers was at the *informational* stage while the next highest concern being at the *management* stage. Almost 57% of the Smart School teachers were identified to be self-concerned while another 35% to be task-concerned and only 8% being impact-concerned.

In terms of Levels of Use (LoU) towards Computer Integration, the Smart School teachers were clustered in the *Mechanical* and *Routine* user levels. About 64% of the teachers were at the lower *Mechanical* LoU while the other 36% at the

higher *Routine* LoU. Overall, only 49% of the Smart School teachers indicated that they possessed high managing ability in Computer Integration. Among the four abilities involved in the management of Computer Integration, the Smart School teachers claimed that *leading* is their highest while *controlling* is their lowest ability. Significant relationship identified between SoC and the Managing Ability of the teachers indicated that teachers with high SoC exhibited higher Managing Ability while those with low SoC exhibited lower ability in terms of planning, organizing, leading and controlling the Computer Integration. In addition, the strength and weakness in the ability of the teachers when implementing the steps/procedure involved in the management of Computer Integration varies according to the concern categories to which they belong.

The Schools Division, Ministry of Education in Malaysia (2001) prepared a report based on data obtained from the monitoring of the implementation of the Smart School Pilot Project in Malaysia. Fourteen monitoring teams were assembled. The teams monitored the implementation of the programme in 62 schools in July and August 2000. The aim of this project was to determine (1) the extent to which the schools had implemented the Smart School programme; and (2) the problems that they had encountered in its implementation. The data collected through four different instruments was used to group the schools into one of four categories, based on the degree to which each school had implemented the programme. The four categories were Basic, Developing, Developed and Advanced. The findings of this study showed that:

> (1) Management of the schools was between the Developing and Developed levels; (2) Management of the languages – English and Malay – was between the Developing and Developed levels; (3) Management of Science and Mathematics was between the Developing and Developed levels; (4) The implementation of instructional processes for the Malay language was at the Developing and Developed levels; (5) The implementation of instructional processes for English was at the Developing Level; (6) The implementation of instructional processes for Science was at the Developing and Developed levels; and (7) The implementation of instructional processes for Mathematics was at the Developing and Developed levels (Ministry of Education Malaysia, 2001).

This report also indicated that schools encountered a number of problems in implementing the Smart School Project. Among these were disruptions in electricity supply, high utility costs, security of equipment and software, the lack of a smart school culture within the school, inadequate computer laboratories, insufficient software, large class sizes, shortage of teachers who are proficient in their respective subject areas, time constraints, public exam formats that are inconsistent with smart school instructional processes, school administrators who lack an adequate understanding of the smart school curriculum and the demands it imposes on teachers.

FINDINGS OF THE STUDY

The questionnaire developed for this study was administered to 882 smart school teachers and 2,689 students in 70 Smart Schools (see Table 1).

A. QUESTIONNAIRE FOR TEACHERS:

First, **Knowledge and Skills in Smart Teaching**. The findings pertaining to the concept of smart schools indicated that the 14-week INSET Course for the Training of Smart School Teachers and In-house Courses in Smart Schools succeeded in raising the teachers' understanding of, and skills in, several aspects, including: the general concept of Smart Schools (60.5%); the Smart School curriculum (85.0%); change management (59.5%); concept and principles of developing instructional packages (71.4%); use of technology (69.5%); the particular subject being taught by the teacher in the Smart School, that is Science, Mathematics, Malay or English Language (70.4%); Smart School instructional strategies (76.8%); and enhancing incidental knowledge and skills pertinent to the teaching in Smart Schools. However, there were two aspects in which deficiencies were noted: the national-level assessment system for Smart Schools and the new skills for the minor subjects taught in Smart Schools (that are subjects other than Science, Mathematics, Malay language and English language).

In terms of planning smart instructional activities, the study showed that the 14-week INSET Course for the Training of Smart School Teachers and In-house Courses in Smart Schools succeeded in enhancing the teachers' knowledge of, and skills in, various aspects of Smart School instruction. It was found that teachers were able to match as well as adapt subject content to the ability of the learners; select appropriate instructional techniques to enhance learning; plan a variety of teaching and learning activities; create a classroom environment that was conducive to learning; develop instructional materials; and select instructional methods that were suited to the ability of the learners. However, teachers required considerable guidance in selecting and using appropriate instructional software.

As a whole, the study indicated that the 14-week INSET Course for the Training of Smart School Teachers and In-house Courses in Smart Schools succeeded in enhancing the participants understanding of, and skills in, the smart instructional process. Consequently, these teachers were able to reinforce learning, explain concepts, pitch their instruction to the ability of the learners, vary their teaching techniques, conduct remedial activities, provide enrichment activities, transmit subject content, use a variety of instructional materials, utilize instructional software, infuse moral values, improve learner participation, and develop the learners' thinking skills including critical and creative thinking skills.

Second, **The Management of Smart Classrooms**. The findings also indicated that the 14-week INSET Course for the Training of Smart School Teachers and In-house Courses in Smart Schools succeeded in enhancing the participants' understanding of, and skills in, managing smart classrooms. The findings indicated that teachers adopted a democratic teaching style in their classrooms, promoted active learning environments, used smart instructional technology, developed a classroom environment that encouraged learning, generated

learner interest in smart instructional processes, instilled discipline among the learners, motivated the learners, made optimum use of allotted time, and enhanced interaction in the classroom.

Table 1
Distribution of Teachers and Students According to State, School and Type of Smart School Teacher Training Course

N	States	Number of Schools	Teachers			Students	
			14-Weeks Course	In-House Training	Total	Number of Students	Percen-tages
1	Kelantan	6	38 (38.0)	62 (62.0)	100 (100.0)	272	(10.1)
2	Wilayah Persekutuan	9	71 (46.1)	83 (53.9)	154 (100.0)	361	(13.4)
3	Johor	9	28 (40.6)	41 (59.4)	69 (100.0)	333	(12.4)
4.	Selangor	6	29 (46.0)	34 (54.0)	63 (100.0)	231	(8.6)
5	Negeri Sembilan	6	45 (43.7)	58 (56.3)	103 (100.0)	252	(9.4)
6	Pahang	6	36 (50.7)	35 (49.3)	71 (100.0)	234	(8.7)
7	Sabah	4	26 (49.1)	27 (50.9)	53 (100,0)	148	(5.5)
8	Kedah	4	34 (61.8)	21 (38.2)	55 (100.0)	162	(6.0)
9	Melaka	2	12 (42.9)	16 (57.1)	28 (100.0)	80	(3.0)
10	Terengganu	2	10 (45.5)	12 (54.5)	22 (100.0)	69	(2.6)
11	Perak	7	33 (52.4)	30 (47.6)	63 (100.0)	230	(8.6)
12	Pulau Pinang	2	9 (39.1)	14 (60.9)	33 (100.0)	51	(1.9)
13	Sarawak	5	28 (51.9)	26 (48.1)	54 (100.0)	186	(6.9)
14	Perlis	2	12 (50.0)	12 (50.0)	24 (100.0)	80	(3.0)
TOTAL		**70**	**411 (46.6)**	**471 (53.4)**	**882 (100.0)**	**2689**	**(100.0)**

A large proportion of the respondents agreed that the 14-week INSET Course for the Training of Smart School Teachers and In-house Courses in Smart Schools assisted them in developing their understanding of, and skills in, various aspects of smart learning assessment and evaluation. Teachers who had participated in these courses reported that they were able to select

teaching materials that were suited to, and enhanced, smart teaching and learning. The courses also assisted them in: selecting appropriate lesson content, utilizing appropriate evaluation methods, carrying out self-evaluation of the effectiveness of their teaching, selecting appropriate teaching activities, enhancing learner mastery of the topics taught, and developing questions of various cognitive levels to assess learner ability and achievement. The courses also enabled the teachers to develop their learner' study skills as well as their mastery of critical and creative thinking skills. However, these courses were only moderately successful in enhancing the teachers' mastery of information technology skills and their ability to assess learner personality and values.

Third, **Implementation of Smart Teaching and Learning Processes**. The 14-week INSET Course for the Training of Smart School Teachers and In-house Courses in Smart Schools also succeeded in equipping teachers with the skills required to implement smart teaching and learning. The courses enabled teachers to master the generic skills and enabled them to infuse these generic skills in smart instructional activities. The teachers reported that they were able to develop smart instructional packages, utilize technological aids in smart teaching – learning procedures, implement smart school instructional strategies, and master the skills of facilitating learning. The courses enabled teachers to develop a clear understanding of the concept of Smart Schools; enhance their knowledge of, and skills in, smart instructional practices, and enabled them to accommodate the paradigm shift and changes in the curriculum mandated by the introduction of Smart Schools. It is clear that the courses succeeded in assisting teachers in acquiring new knowledge and skills, developing existing understandings, and enhancing existing skills as well as generating an interest in smart instruction among the teachers themselves.

This study also investigated the extent to which teachers were able to apply in the classroom the knowledge and skills that they had acquired from the 14-week INSET Course for the Training of Smart School Teachers and In-house Courses in Smart Schools. The data indicated that these courses were only moderately successful in enabling teachers to do this. A large proportion of the lessons that the teachers conducted were learner-centered. Slightly less than half of the teachers (49.3%) were able to infuse critical and creative thinking skills into their lessons. A large proportion of teachers were also only able to implement a small portion of the national assessment system in the Smart Schools. Only 43.1% of the respondents were able to carry out formative assessment of learner progress using the various available techniques. Only 43.4% of the respondents were able to develop a limited number of smart instructional packages. As well, 48.5% of the respondents indicated that they were only able to utilize a small proportion of the available technological aids. Also, 43.2% of teachers indicated that they were able to infuse only a small proportion of the higher order thinking skills in their teaching. Less than half of all the respondents were able to infuse moral values, function as facilitators of learning, inculcate study skills among learners, and infuse Malay language

skills in smart instruction.

Fourth, **Monitoring and Evaluation of Smart Schools**. In implementing smart instruction in schools, a large proportion of the respondents reported adequate supervision by: the Senior Assistant responsible for Student Affairs (74.7%); the Senior Assistant responsible for the Curriculum (75.6%); and Teacher Training College lecturers (81.4%). Between 1 and 3 in-class observations were made by the Headmaster/Principal (23.9%); the Senior Assistant (25.7%); the Subject Head (41.3%); colleagues (33.7%); Teacher Education Division officers (24.6%); Teacher Training College lecturers (24.7%); State Education Department officers (19.3%); the District Education Officer (9.9%); Divisional Education Officers for Sabah and Sarawak only (7.3%); and officers from the School Inspectorate (18.6%).

The study also provided insights into the constraints that impeded teachers in applying the knowledge and skills that they had acquired from the courses in their respective schools. Among the constraints reported by teachers were their workload (84.9%); inadequate financial allocations (80.9%); exam pressures (87.6%); time constraints (84.8%); the demands of the syllabus (84.3%); their own shortcomings (76.1%); inadequate support from the school administration (71.8%); lack of equipment and facilities (79.2%); conflicting directives from top management (77.6%); learner factors (68.8%); inadequate cooperation from colleagues (66.3%); and lack of support from the District Education Officer (54.5%).

The findings of the study also allowed for the identification of several factors that impacted on the teachers' implementation of the Smart Learning concept and the related instructional strategies in their respective schools. The workload shouldered by the teachers was reported by the highest percentage of respondents (65.2%) as hindering their implementation of the programme. This was followed by the lack of appropriate software (64.2%); difficulty in developing instructional packages (61.8%); and inadequate information technology equipment and facilities (53.5%). Only a small percentage of teachers reported other factors as impacting negatively on their implementation of smart learning. These factors included the Smart School curriculum (38.8%); learner performance (38.8%); teachers' knowledge of, and skills in utilizing technological aids for smart instruction (33.6%); learners' willingness and ability to engage in smart teaching and learning activities (33.5%); acknowledgement and validation of the teachers' roles and support from the school administration (32.6%); learners' study skills (30.7%); teachers' knowledge of, and expertise in generic skills (24.3%); monitoring by the school authorities (24.1%); teachers' knowledge of, and expertise in applying the Smart School concept (21.6%); teachers' confidence in providing smart instruction (20.6%); teachers' knowledge of, and expertise in, functioning as facilitators of learning (19.6%); and finally, knowledge of, and expertise in, critical and creative thinking skills (17.1%).

As a whole, the findings indicated that 82.8% of the respondents were able to apply the knowledge and skills that they had acquired from the Smart School courses.

Fifth, **Factors that Motivated Teachers to Implement the Smart School Programme**. While the findings above indicated that teachers encountered a number of constraints in their efforts to implement the Smart School programme in their respective schools, there were also a number of factors that motivated the teachers to persist in applying the knowledge and skills that they had acquired from the Smart School courses. The following factors, arranged according to frequency, influenced the teachers:

> The most important factor that motivated the teachers to persist in applying the knowledge and skills that they had acquired from the Smart School courses was their desire to develop their knowledge and skills (84.3%); Teachers' desire to make effective use of the knowledge that they had acquired (84.1%); Teachers felt that it was their duty and responsibility to transfer the knowledge and skills that they had acquired (82.9%); Teachers' desire to share their knowledge (81.5%); Rising to the challenge of discharging their duties (77.7%); The school culture (77.5%); The relevance of the knowledge that they had acquired to the subject that they taught (77.9%); The School leadership (76.9%); Teachers' satisfaction in successfully discharging their responsibilities (76.2%); Teachers' mastery of the course content (72.0%); Teachers role as resource persons (67.2%); and Teachers' satisfaction with their present jobs (67.1%).

Sixth, **Dissemination of Smart Teaching and Learning Knowledge and Skills**. The study also examined the extent to which teachers were able to transfer the knowledge and skills that they had acquired from the 14-week INSET Course for the Training of Smart School Teachers to other teachers, as well as the frequency of this training, the problems that were encountered and the factors that influenced the teachers. About 84.4% of the respondents reported that the sponsors of the course (The Teacher Education Division) had directed them to share the knowledge and skills that they had acquired from the course. Additionally, almost all the respondents (92.9%) reported that they had been directed by the school administration to conduct In-house Training in order to share their knowledge of, and expertise in, smart instruction with other teachers in the school. The findings indicated that teachers conducting courses at the school level were more likely to provide personal guidance to other teachers than were those teachers who conducted courses at the district, or state levels, or even in other schools. Also, a large proportion of the respondents indicated that they had a high level of mastery of smart instruction. Consequently, it was found that 69.1% of the respondents were confident that they could conduct courses for other teachers in their school. However, teachers were less confident in conducting courses at the district, or state levels, or even in Teacher Resource Centers. Also, 77.8% of the respondents reported that they had the opportunity to teach the subject for which they had attended the 14-week INSET Course for the Training of Smart School Teachers.

A large proportion of the respondents indicated that recognition of their roles, monitoring by the relevant authorities, action plans for in-house training, satisfaction, leave facilities, lecture fees, requests from Subject Head, opportunities to further their studies, and the annual performance assessments

were factors that impacted on their decision to transfer the knowledge and skills that they had acquired from the 14-week INSET Course for the Training of Smart School Teachers. As well, factors such as course materials, software, information technology equipment and facilities, and their workload also influenced their willingness to conduct in-house course for other teachers.

Seventh, **Problems in Implementing the Smart School Programme**. This study attempted to obtain the respondents' perceptions pertaining to the problems in implementing the Smart School concept and smart instructional strategies in their respective schools in terms of the teachers, learners, equipment/facilities and management.

Problems relating to the teacher factor included workload, confidence in providing smart instruction, knowledge of, and skills related to Smart Learning concepts, facilitating skills, knowledge of and skills in providing instruction in critical and creative thinking, knowledge of generic skills, and competence in utilizing technological aids. All of these factors impacted negatively on the teachers' implementation of smart instruction in their respective schools.

Problems relating to the learner factor included weaknesses in learners' preparedness and ability to participate in smart instruction, lack of study skills and unsatisfactory learner performance.

Problems related to the equipment and curriculum included the lack of suitable software, difficulty in implementing the Smart School curriculum, weaknesses in the Smart School curriculum, inadequate information technology facilities and equipment, and difficulties in developing instructional packages.

The main problems relating to the management of the programme identified by the respondents were monitoring by upper-level management, as well as recognition of, and support for their roles.

Nonetheless, 90.8% of the respondents attempted to apply the knowledge and skills that they had acquired from the 14-week INSET Course for the Training of Smart School Teachers.

The following factors motivated the respondents to persist in applying the knowledge and skills that they had acquired from the 14-week INSET Course for the Training of Smart School Teachers:

I. Teacher factors:
   - Interest in enhancing their knowledge/skills;
   - Their role as a resource person consulted by their colleagues;
   - Sense of duty in transferring the knowledge and skills they had acquired;
   - Satisfaction in performing their job;
   - Meeting and overcoming the challenges arising from their duties and responsibilities;
   - Sense of gratification in performing their duties; and
   - The desire to share knowledge.

II. School culture and leadership.

III. Mastery of the course content.

Eighth, **Effectiveness of the 14 Week INSET Smart School Teacher Training Course**. The study also investigated the extent to which the 14-week INSET Course for the Training of Smart School Teachers succeeded in enhancing participants' knowledge of, and expertise in the basic smart learning concepts, planning smart instruction, smart instructional processes, managing smart classrooms, and assessment and evaluation of smart learning.

For this purpose, the research team used the following scale to interpret the mean scores.

Mean Score	Interpretation
1.0 to less than 1.8	Did not assist at all
1.8 to less than 2.6	Did not assist
2.6 to less than 3.4	Assisted to some degree
3.4 to less than 4.2	Assisted
4.2 to 5.0	Assisted a lot

Table 2 shows the respondents' perceptions of the effectiveness of the 14-week INSET Course for the Training of Smart School Teachers in enhancing their knowledge and expertise in five domains of smart instruction, that is, key smart learning concepts, planning smart instruction, smart instructional procedures, management of smart classrooms, and assessment and evaluation of smart learning. Using the interpretation of the mean scores described above, it was found that the 14-week INSET Course for the Training of Smart School Teachers as well as the In-house Courses assisted greatly in enhancing the knowledge and expertise of the respondents. The mean scores for the five domains of smart instruction, that is, key smart learning concepts, planning smart instruction, smart instructional procedures, management of smart classrooms, and assessment and evaluation of smart learning were 3.70, 3.75, 3.84, 3.82 and 3.66 respectively.

Table 2
Effectiveness of the 14-week INSET Course for the Training of Smart School Teachers

N	Aspects	DNAAL	ATSD	A	Total	Mean	S.D.
1.	The 14-Week INSET Course and In-House Courses assist to enhance the knowledge and expertise in **smart learning concept**	26 (2.9)	352 (39.9)	504 (57.1)	882 (100.0)	3.7005	.6019
2.	The 14-Week INSET Course and In-House Courses assist to enhance the knowledge and expertise in **planning smart instruction.**	32 (3.6)	264 (29.9)	586 (66.4)	882 (100.0)	3.7546	.6509

3.	The 14-Week INSET Course and In-House Courses assist to enhance the knowledge and expertise in **the smart instructional procedures**.	18 (2.0)	283 (32.1)	581 (65.9)	882 (100.0)	3.8437	.5824
4.	The 14-Week INSET Course and In-House Courses assist to enhance the knowledge and expertise in **the management of smart classrooms**	27 (3.1)	227 (25.7)	628 (71.2)	882 (100.0)	3.8250	.6042
5.	The 14-Week INSET Course and In-House Courses assist to enhance the knowledge and expertise in **the assessment and evaluation of smart learning.**	26 (2.9)	341 (38.7)	515 (58.4)	882 (100.0)	3.6640	.5789

KEY:
DNAAL = Did not assist at all.
A = Assisted.
ATSD = Assisted to some degree.
S.D. = Standard Deviation.

The study also attempted to determine if there were differences in the effectiveness of the 14-week INSET Course for the Training of Smart School Teachers and the In-house Courses in developing the participants' knowledge of, and expertise in the five domains of smart instruction.

Table 3
Comparison of the Effectiveness of the 14-Week INSET Course and the In-house Course

N	Aspects	Smart School Courses	N	Mean	S.D.	df	t-value	P
1.	The 14-Week INSET Course and In-House Courses assist to enhance the knowledge and expertise in **smart learning concept.**	14-Weeks INSET	411	3.8511	.5557	880	7.139	.000
		In-House	471	3.5690	.6103		7.185	
2.	The 14-Week INSET Course and In-House Courses assist to enhance the knowledge and expertise in **planning smart instruction.**	14-Weeks INSET	411	3.8362	.6088	880	3.499	.000
		In-house	471	3.6834	.6782		3.525	

3.	The 14-Week INSET Course and In-House Courses assist to enhance the knowledge and expertise in **smart instructional procedures.**	14-Weeks INSET	411	3.9300	.5391	880	4.147	.000
		In-House	471	3.7684	.6084		4.181	
4.	The 14-Week INSET Course and In-House Courses assist to enhance the knowledge and expertise in **the management of smart classrooms.**	14-Weeks INSET	411	3.9213	.5526	880	4.470	.000
		In-House	471	3.7410	.6346		4.512	
5.	The 14-Week INSET Course and In-House Courses assist to enhance the knowledge and expertise in **the assessment and evaluation of smart learning.**	14-Weeks INSET	411	3.7301	.5501	880	3.187	.001
		In-House	471	3.6062	.5975		3.205	

KEY: N = Frequency.
df = Degree of Freedom.
p = probability (two-tail).
S.D. = Standard Deviation.

Table 3 compares the effectiveness of the 14-week INSET Course for the Training of Smart School Teachers and the In-house Courses in enhancing the respondents' knowledge of, and expertise in the five domains of smart instruction. In the case of the 14-week INSET Course for the Training of Smart School Teachers, mean scores of 3.85, 3.84, 3.93, 3.92 and 3.73 respectively were obtained for the five domains of key smart learning concepts, planning smart instruction, smart instructional procedures, management of smart classrooms, and assessment and evaluation of smart learning. All of these mean scores were *higher* than those obtained by the participants of the In-house Courses, that is, 3.57, 3.68, 3.77, 3.74 and 3.60 respectively.

Using the table for the Interpretation of the Mean Scores above, the mean scores for the 14-week INSET Course for the Training of Smart School Teachers as well as the In-house Courses indicate that both courses were very effective in developing the participants' knowledge of, and expertise in the five domains of smart instruction.

B. QUESTIONNAIRE FOR LEARNERS

The study also investigated the impact of smart instruction on the students of all 70 Smart Schools. As stated earlier, a total of 2,689 students who had undergone smart school instruction were surveyed. They comprised 853 (31.7%)

Form One students; 1270 (47.2%) Form Two students; 392 (14.6%) Form Four students; and 175 (6.5%) Form Five students. The total number of respondents comprised 1,255 (46.7%) males and 1,434 (53.3%) females. The racial breakdown of the respondents indicated that there were 2,269 (84.4%) Malays; 207 (7.7%) Chinese; 32 (1.2%) Indians; and 181 (6.7%) students of other ethnic origin.

First, **Smart School Teaching and Learning Strategies**. The first domain that the respondents were required to respond to was their rating of *teachers' use of smart school teaching and learning strategies*. The data showed that 2,490 (95.6%) students indicated that their teachers actively involved the students in the lessons. About 2,537 (94.3%) of the students reported that the instruction that their teachers provided required them to think, while 1,912 (71.1%) indicated that they were required to engage in the higher order thinking skills. About 2,274 students (84.6%) also reported that their teachers infused moral values in their instruction. Students (2,503 students or 93.1%) also indicated that their teachers were able to facilitate learning. Smart School teachers were also able to impart study skills through their teaching (2,153 students or 79.7%). A total of 1,838 students reported that their teachers emphasized Malay language skills in their teaching. Another 2,229 students (82.9%) indicated that Smart School teachers emphasized continuing education using a variety of techniques. Also, 2,091 students (77.8%) reported that teachers implemented the Smart School curriculum in their instruction. Teachers also succeeded in explaining new content effectively and in pitching their instruction to the ability of the learners as well as creating classroom environments that facilitated active learning.

Second, **Smart School Instructional Materials**. The second domain to which the students responded was *the smart school instructional materials that their teachers utilized*. The data revealed that 2,110 students (78.4%) reported that their teachers utilized new and innovative instructional materials including using computers for instruction (1,458 students or 54.2%); instructional materials (2,123 students or 54.2%); various types of instructional aids (1,979 students or 73.6%); and instructional software (1,933 students or 71.9%). These findings show that the smart school teachers utilized a variety of resources when providing smart instruction.

Third, **the Management of Smart School Classrooms**. The third domain was *the management of smart school classrooms*. The findings indicated that 2,399 students (89.2%) reported that teachers had succeeded in enhancing learner participation in the instructional process. About 2,425 students (91.1%) reported that teachers provided them with opportunities to express their views and opinions in the classroom. Around 2,143 students (79.9%) reported that teachers had succeeded in arousing the interest of the learners in the instructional process. Smart school teachers also succeeded in instilling discipline among learners (2,113 students or 78.6%). Around 2,128 students (79.1%) reported that teachers had succeeded in motivating the learners to learn. Consequently, effective use was made of the time available for instruction (2,183 students or 81.1%). Around 2,416 students (89.9%) perceived that teacher – student and

student – student relationships were good. The findings of this study confirm that teachers were able to manage smart classrooms effectively.

Fourth, **Assessment and Evaluation of Smart Instruction**. The fourth domain was the *assessment and evaluation of smart instruction*. The data obtained indicated that 2,446 students (91.0%) reported that teachers assessed student learning during each instructional episode. Around 2,359 students (87.7%) reported that teachers reinforced learning. Only 1,933 students (71.5%) reported that teachers conducted teaching activities. About 2,093 students (74.1%) reported that teachers conducted enrichment activities. Teachers also provided opportunities to learners to assess their peers (1,649 students or 71.3%). As a whole, the learners' perceptions were that teachers were effective in carrying out assessment and evaluation of smart learning.

Fifth, **Perceptions of the Internet**. The fifth domain pertained to the respondents' *perceptions of the Internet*. The data indicated that 2,603 students (96.5%) viewed the Internet as an effective communication tool. Only 888 students (33.0%) had been taught to surf the Internet by their teachers. Around 1,470 students (54.6%) learnt to surf the Internet from their peers. Another 1,299 students (48.3%) were self-taught. Of the 2,689 respondents of the study, only 1,149 students (42.7%) had access to the Internet at home. About 1,448 students (53.9%) reported that they used the Internet to access information. Around 1,451 students (53.9%) were confident that their teachers were proficient in surfing the Internet. Only 2,211 students (82.2%) were of the view that materials accessed from the Internet were appropriate for smart instruction. And 1,711 students (63.7%) believed that materials accessed from the Internet aided them in revising outside class hours. These findings indicate that learners had a high degree of confidence in the use of the Internet in smart instruction.

Sixth, **Smart Instruction**. The sixth domain that was investigated was *smart instruction*. The data indicated that 1,896 students (70.5%) believed that smart instruction saved time. Around 1,829 students (58.0%) indicated that the use of multimedia assisted them in understanding specific lesson content more quickly. As well 2,069 students (76.9%) reported that smart instruction was enjoyable.

In order to investigate the differences, if any, in the level of acceptance of smart instruction by male and female respondents in the six domains, the research team compared the mean scores in each domain to determine the impact on male and female students. Mean scores between 4 and 5 were regarded as having a *High* impact, scores between 3 and 3.99 were regarded as having a *Moderate* impact, while mean scores between 1 and 2.99 were considered to have a *Low* impact. The maximum possible mean score was 5.

The data indicated that male respondents obtained higher mean scores than female respondents. However, when viewed holistically, the level of acceptance of smart instruction by both male and female respondents varied from *Moderate* to *High*.

Table 4
Differences in the Level of Acceptance of Smart Instruction between Male and Female Students

ASPECTS	SEX	N	MEAN	S.D.
Smart School Teaching and Learning Strategies	Male	1255	4.2013	.4760
	Female	1434	4.2169	.5053
Smart School Instructional Materials	Male	1255	3.9120	.7743
	Female	1434	3.8635	.7901
The Management of Smart School Classrooms	Male	1255	4.2402	.6108
	Female	1434	4.2705	.6113
The Assessment and Evaluation of Smart Instruction	Malre	1255	3.9989	.5916
	Female	1434	4.0271	.6145
Perceptions of the INTERNET	Male	1255	3.6095	.6175
	Female	1434	3.6066	.6154
Smart Instruction	Male	1255	4.0494	.8327
	Female	1434	4.0437	.8031

KEY: N = Frequency.
S.D. = Standard Deviation.

DISCUSSION

The study involved 882 Smart School teachers and 2,689 students in 70 Smart Schools throughout Malaysia. The findings of the study show that Smart School teachers acquired a diverse range of knowledge and skills related to smart instruction from the 14-week INSET Course for the Training of Smart Schools Teachers and from In-house Courses. These teachers reported that they had succeeded in mastering various aspects of the concept of smart instruction, planning smart teaching, managing smart instruction, and managing the smart classroom. They had not, however, fully mastered the national-level Smart School assessment and evaluation system. Nonetheless, it is clear that the 14-week INSET Course for the Training of Smart Schools Teachers and In-house Courses were at least *moderately* successful in assisting teachers in applying in the classroom the knowledge and skills that they had acquired from the courses. Weaknesses were revealed in the following aspects: training skills, assessment and evaluation of smart learning; selection and use of software; the generic skills, particularly in infusing higher order critical and creative thinking skills; planning and preparing learning packages; information technology skills; and implementation of the smart school curriculum in the school. This indicates a need for strong support, and on-going guidance as well as monitoring by the relevant authorities.

There were also a number of constraining factors that impacted on the teachers' ability to implement smart instruction in their respective schools. Among these factors were their workload, insufficient financial resources, examination pressures, time constraints, demands of the syllabuses, their own ability, conflicting instructions/direction from the higher authorities, learner factors, the cooperation of their peers, and support from the school

authorities. Smart School teachers also encountered problems relating to software, planning and preparation of instructional packages, and inadequate information technology facilities and equipment. These findings are consistent with the findings of the studies by Lee Lai Guan *et al.* (2000) and Siti Suria Salim (2001).

While teachers were constrained in their implementation of the Smart School programme by the factors discussed above, there were other factors that motivated them to persist in applying and utilizing the knowledge and skills that they had acquired from the Smart School courses that they had attended. Teachers showed a high degree of interest, a willingness to apply the knowledge that they had acquired, an ability to confront challenges and expressed satisfaction in discharging their duties and responsibilities.

A total of 69.1% of the teachers reported a high degree of confidence in providing training to their peers in their own school but were less confident in providing training to teachers either in the Teacher Resource Center, or at the district or state levels.

On the whole, the 14-week INSET Course for the Training of Smart Schools Teachers and In-house Courses succeeded in enhancing the teachers' knowledge of, and skills in providing smart instruction. The 14-week INSET Course for the Training of Smart Schools Teachers was perceived to be more effective in training smart school teachers than the In-house courses.

Smart School learners had a positive view of, and were receptive to Smart School instruction. They had a positive view of the teaching and learning strategies used by smart school teachers, the instructional materials used by smart school teachers, teachers' management of smart classrooms, smart school assessment and evaluation, the use of the Internet in instruction, and smart school instruction. Nonetheless only 33.0% of the students learnt about the Internet from their teachers. As well, only 42.7% of students had Internet facilities in their home, and most had learnt to surf the Internet either from their friends or on their own. Male respondents had higher mean scores than female students in their acceptance of smart teaching and learning. On the whole, smart school instruction has had a moderate to high impact on smart school learners.

RECOMMENDATIONS

The findings of this study revealed a number of the strengths and weaknesses of the 14-week INSET Course for the Training of Smart Schools Teachers and In-house Courses. The research team offers the following recommendations to enhance the planning and implementation of the Smart School programme in Malaysia as follows:

First, the curriculum for the 14-week INSET Course for the Training of Smart Schools Teachers and In-house Courses, which is developed and implemented by the Teacher Education Division, must be reviewed so that course participants benefit from the courses and develop the confidence necessary to implement

the smart school curriculum. The following aspects need to be improved and given added attention:

> A "training for trainers" component should be included to ensure that teachers possess the requisite knowledge and skills to enable them to develop training courses at the school, district and state levels. At the very least, they should be able to conduct In-house Courses at the school level more effectively.
>
> As for the assessment and evaluation of smart learning, it is necessary for teachers to be proficient in constructing questions for the various levels of difficulty and to assess formative learner progress using a variety of methods.
>
> Emphasis on knowledge and skills that will allow them to select and use software that can be utilized in smart instructional activities.
>
> Generic skills, especially the infusion of higher order critical and creative thinking skills.
>
> Planning and developing instructional packages.
>
> Information technology courses.
>
> Implementation of the Smart School curriculum in instruction in schools.
>
> Necessity of developing a mentoring system at the school level that offers continuing guidance and advice to teachers after the completion of their course.

Second, it is necessary that the course lecturers be very well trained in order to ensure the effectiveness of the 14-week INSET Course for Training Smart School Teachers conducted by the teacher training colleges.

Third, a monitoring and mentoring system involving the Ministry of Education, the School Inspectorate, the State Education Departments, District Education Offices, principals, senior assistants, master teachers and senior subject teachers must be set in place. This monitoring and mentoring is important to assure quality in the implementation of the Smart School programme at the school level. Without this monitoring and mentoring, it is unlikely that the Smart School programme will achieve the desired objectives. Additionally, it is also necessary for the lecturers at teacher training colleges to offer continuing guidance to teachers in the Smart Schools.

Fourth, after the completion of the 14-week INSET Course for Training Smart School Teachers, participants should be capable of developing instructional packages for the subject(s) that they are teaching in their schools. A programme to plan and develop instructional packages at the school level must be devised and must have the backing and support of the school principal. Schools should not depend on the software that is still not forthcoming from the Educational Technology Division of the Ministry of Education. Waiting for this software will result in a waste of time and disrupt the implementation of the Smart School programme.

Fifth, up to December 1998 only 30% of all the lecturers from the teacher training colleges in Malaysia were computer literate (Mohammed Sani Ibrahim, 1997). It is recommended that all lecturers should be trained in smart instructional techniques and that all of them should be involved in the training of teachers from schools that are adjacent to their respective colleges. Instead of being limited to the four core subjects (English language, Malay language,

Mathematics and Science), all teachers should be provided training so that the process of infusing smart instructional elements can be hastened.

Sixth, lecturers and teachers who have experience in smart instruction need to be encouraged to involve themselves directly in investigating and writing about smart instructional pedagogy. There is an immediate as well as a future need for new approaches and ideas for all subjects that have been proven to be pedagogically effective. Articles and research findings can be disseminated through journals, books and educational seminars that should be organized on a regular basis.

Seventh, presently, only teacher training colleges have been given the responsibility of conducting courses for training Smart School teachers. It should be made compulsory for all Education Faculties in all the local universities to conduct such courses for their undergraduates.

Eighth, consistent with the desire of the Ministry of Education to infuse smart instructional practices in all schools, it is necessary that senior assistants, subject heads, and master teachers be trained and be proficient in information technology and smart instructional strategies for their respective subject specializations so that they can offer continuous monitoring, guidance and counseling services that are systemic and effective to the smart school teachers under their charge. This study has revealed serious deficiencies in these aspects in the management of Smart Schools.

Ninth, all school administrators (principals/headmasters) must be provided with courses in effective management of Smart Schools. Their mindsets need to be focused on developing their respective schools into effective Smart Schools in as short a duration as possible so that their students are prepared to confront the challenges of the onrushing technological era.

Tenth, the Ministry of Education must provide all the required infrastructure facilities, equipment and software that is necessary for smart instruction to be provided to our students.

CONCLUSION

The findings that are reported in this paper provide some indications of the effectiveness of the 14-week INSET Course for the Training of Smart Schools Teachers and In-house Courses, and also indicate their impact on the type of smart instruction provide in the Smart Schools.

Overall, this study indicated that the impact of integrating technology in the Smart School teaching and learning strategies and processes in Malaysian Smart Schools varied from moderate to high. One of the foci of Malaysian Smart Schools is the wide use of computer technology in enhancing the teaching-learning processes. Technology as an enabler, is supposed to smoothen the teaching-learning strategies by assisting teachers in accessing information from a wide variety of sources either through LAN, WAN or Internet. In short, Integration of Computer into Teaching-Learning (Computer Integration) seems to be a characteristic feature of the Malaysian Smart Schools. Although

many factors have been identified, the human factor being the most important component for any innovation to be implemented, has to be dealt with sincerely and seriously. Teachers need to be committed seriously in their effort. At the same time, they cannot be left alone to develop themselves. They need professional development and ongoing support to remain abreast in the fast changing technology era.

The findings indicate the necessity for a series of strategic measures to be carried out by the Ministry of Education and all the other agencies that are involved in order to ensure the more effective implementation of the Smart School programme. The process of converting all schools into smart schools requires effective planning in all related aspects and also requires a high degree of commitment among all individuals and agencies involved, including the Ministry of Education in Malaysia.

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