An Examination of the Concept of Smart School: An Innovation to Address Sustainability

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Abstract—The smart school is a technology-based teaching-learning institution for preparing children for the Information Age. To achieve smarts schools educational objectives, these teaching and learning concepts should be covered: curricular, pedagogy, assessment and teaching-learning materials. Information and communication technology (ICT), as second pillar of smart school, plays many roles in a smart school, from facilitating teaching and learning activities to assisting with school management. For instance, some of technologies which can equip a smart school might be classrooms with multimedia courseware and presentation facilities, computer laboratory for teaching, multimedia development center and server room equipped to handle applications, management databases, and web servers. Although in recent years some efforts have been done for developing smart schools, there is not a pre-defined and an efficient solution for establishing ICT environment for smart schools. The main objective of this research is to examine pertinent aspects of smart school's concept, namely matters pertaining to teacher training, information technology (IT) infrastructure, and curriculum design to ensure that the innovation can successfully nurture a workforce prepared to meet the challenges of the ICT era.

Keywords: Smart School, E-Learning, ICT Infrastructure

I. INTRODUCTION

In our view, one of the important programs for using information technology and communication (ICT) is smart school. This reality was investigated through some observation in ministry of education. Although there are few efforts to implement smart school in private and public sector, it was realized these efforts uses different information technology infrastructure (platform), ideas and teaching material. In order to encourage for successful development of smart school, an ICT infrastructure framework should be developed. On the other hand, successful practice of Malaysia in development of smart school has led us to investigate and analyze Malaysian smart schools' achievement. We observe and document success factors of smart school in Malaysia whereby this will help us to develop an ICT infrastructure framework for smart school. This research reviews four pillars of smart school including people, education material, technology and process. Main concepts of smart school are then identified [1].

II. E-LEARNING

E-Learning can be described as the use of ICT in learning process. Various tools and technologies including e-mail, internet, video streaming and virtual classrooms can be applied for this purpose. For example, one of the concerns of e-Learning in context of a learner is to connect him/her to a network in order to access course materials. This also will supported be by other tools like course management system and virtual classrooms. Andersson and Grönlund [2] had analyzed several related papers regard to e-learning activities in different developing countries and finally they developed a conceptual framework for e-learning as shown in Table 1.

Table 1: Conceptual Framework for Challenges of E-learning (Andersson & Grönlund, 2009)

Categories	Subgroup	Challenges
Individual	Student	Motivation Conflicting priorities Economy Academic confidence Technological confidence Social support employers Gender Age
	Teacher	Technological confidence Motivation and commitment Qualification and competence Time
Course	Course Design	Curriculum Pedagogical model Subject content Teaching and learning activities Localization Flexibility
	Support provided	Support for students from faculty Support for faculty
Contextual	Organizational	Knowledge management Economy and funding Training of teachers and staff
	Social /Cultural	Role of teacher and student Attitudes on e-learning and IT Rules and regulations
Technological		Access Cost Software and interface design Localization

Developing countries will benefit e-learning if they think for innovative ways to deliver online content on the national backbone.

III. SMART SCHOOL REQUIREMENTS

The smart school is a technology-based teaching-learning institution for preparing children with the effective functionality of smart school which requires skilled staff, and well-designed teaching, learning and supporting processes [3]. It encourages active thinking process while its' environment motivates students to use personal computers (PCs), the internet and intranets as research and communication tools. Students are able to access online libraries, use electronic mail (e-mail) or combination of desktop video-conferencing and chat rooms for doing tutorials [4].

The idea of the smart school is defined to revolutionize the education system through development of a holistic approach that concerns on making value based education available to anyone, anytime and anywhere. Implementing smart schools successfully will be a complex task, requiring changes teaching-learning processes; management functions; people, skills and responsibilities; and technology.
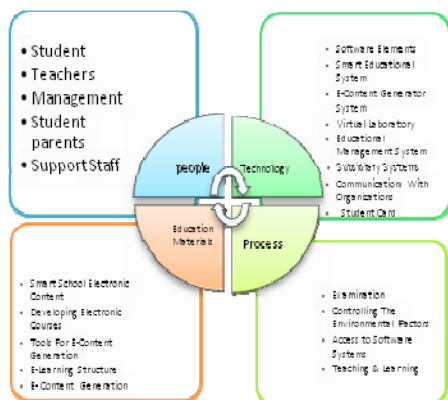

Figure 1: Proposed Framework

IV. IMPLEMENTATION OF MALAYSIAN SMART SCHOOL

With regard to above discussion, the researchers then analyzed the implementation of Malaysian smart schools. In order to achieve this objective, several documents and reports of Malaysian smart school activities have been studied. The researchers have conducted several case studies on smart schools in Malaysia. This section provided a summary on efforts and achievements of Malaysia in smart school development through fifteen years [5]. The smart school is planned to achieve the following objectives:

To produce a thinking and technology literate workforce.

To develop a workforce for the information age.

To develop students physically, mentally, emotionally and spiritually.

To provide opportunities to improve individual strengths and abilities.

To democratize education.

Successful transformation of traditional schools into smart schools requires:

support different stakeholders including educational agencies;

sufficient funds to establish and maintain smart schools;

appropriate guidelines for supporting the schools;

effective and efficient administrative for schools;

sufficient deployment of information technology in smart schools;

Besides technology, teaching-learning strategies, management and administrative processes, and well-trained people are the requirements of smart school. Consequently, a nation-wide system of smart schools will depend on advanced IT at national level. The role of IT in a smart school includes facilitating teaching and learning activities and assisting school management [6]. Fully equipped smart school might include the following:

Classrooms with multimedia courseware and presentation facilities.

Media center for multimedia courseware presentation.

Network resources like internet.

Computer laboratory for teaching courses such as Computer Studies.

Multimedia development center for creating teaching materials.

Studio/Theatre for centralized teaching and videoconferencing.

Teachers' room with online access to courseware catalogues and databases, information and resource management systems.

Administration offices for managing students' data and facilities for tracking student and teacher performance or resources.

Server room to handle applications, management databases, and web servers; provide security.

The Learning Systems Technology Architecture (LTSA) is an architecture that is developed by LST committee of IEEE in 2003. This standard specifies a high-level architecture for information technology-supported learning, education, and training systems that describes the high-level system design and the components of these systems [7].

V. FOUR LESSONS TO LEAD AND PUT THE SMART SCHOOL ON THE RIGHT TRACK

A. Lesson 1: Structure of the Smart Schools

In terms of the effective individuals in the smart schools, the key questions as follows:

i. What are the roles and responsibilities of the individuals?

ii. What knowledge and skills are required?

iii. What kind of education is required?

The Effective Roles in the Progression of the objectives of the smart schools are as follows: the teachers, the managers, the support staff and other educational staff, the

parents and the community. Each group of these people has got specific roles for fulfilling the idea of the smart schools totally and in order to do their duties, they must be experts in the knowledge, culture and specific skill. However, these knowledge, skills and behaviors are fulfilled via the comprehensive educational courses for each group as the members of the project(Zigler et al., 2011)[8]. In continue, the contents of the educational suggested programs are explained for the beneficiaries of the school.

B. Lesson 2: Student

The smart school prepares the students to enter a more modern and worldwide environment successfully. The smart schools nourish the creative problem-solving skills in the new situations and the students are taught to have dare and courage in their decision-making and the responsibility assumptions., and for guaranteeing technical support and facility maintenance [9].

The students will be capable of undergoing an informational journey all around the world, search for the information and collect them. Other than having access to the resources inside of the websites, they will have access to the national and international resource centers via tools such as Internet and intranet. Other than having access to database, the smart school provides a network for interaction with the students, the teachers and people all around the world and eventually leads to the expansion of the students' world via these communications.

C. Lesson 3: Teacher

The teachers in the smart schools play the role of a guide. The teacher's training is the most important activity that must be done in the beginning of the smart schools. [10]The teachers are considered the first presenters of knowledge. The continuous learning is considered as a career necessity for all the members of the smart community, so that they progress along with the improvements in the professional activities and trust the technology(Sang et al., 2010). We must be careful in selecting the teachers of the smart schools, so that to be regarding to designing of the educational processes in the smart schools [11].

The roles and the responsibilities of the teacher in the smart schools are as following:

- The planning and the provision of the teaching affairs and designing the educational contents and resources proportional to the needs of the students
- The management of the educational technology and controlling the procedures in the classroom
- Verification of the professional duties in the teaching and learning environment and a constructive communication with the colleagues and the parents
- Offering an effective education and creating motivation in the students and the assessment of their learning in all of the educational periods.
- Using the technology in the education matters properly

D. Lesson 4: Management

The main pillars of the educational programs of the management of the smart school are as follows:

- The concepts, the processes, structure and how to evolve and change the smart schools
- The planning methods, organization and controlling
- The assessment of the technology, the analysis of the potentials and the
- The basic skills of the information and communication
- Working with the management software
- The methods for evaluating the efficiency of the school and staff [12].
- The basic skills of IT and getting familiar with ICDL (word-power point)
- The education of working with the controlling systems
- The education of using the side systems such as camera and audio systems

VI. SMART SCHOOLS AND SUSTAINABLE DEVELOPMENT

As mentioned earlier, the concept of a smart school is still a work in progress and hence, the evolutionary refinement reflects the advances in pedagogy and improvement in IT. Equally, sustainable development is an evolving and dynamic concept in terms of its conceptual definition. Accordingly, this paper adopts the view advocated by the World Commission on Environment and Development [13] on the description of sustainable development: "Sustainable development is development that meets the needs of the present without compromising [or, impairing] the ability of future generations to meet their own needs [or, to enjoy similar, if not better, quality of life and opportunity as ours]" (p.43).

Sustainable development is generally perceived as an overlapping of dimensions or components, namely environment, cultural and society, and economy [14]. These three dimensions are thought to operate, metaphorically, as three overlapping same-sized circles with the overlapping area being perceived as the human well-being. The more aligned the three dimensions are, the higher the area of overlapping which, in turn, translates to higher levels of human well-being. The corollary that stems from this metaphorical perception on sustainable development is that a balanced, harmonious, symbiotically interdependent, and aligned consideration of environmental, societal and economic dimensions is needed in our pursuit of development and enhanced quality of life.

Therefore, with the advent of smart schools, it is the hope that the future generations are adequately skilled and equipped for the information age without compromising the perpetuation cherished noble values and culture

VII. CONCLUSION

The smart school is a school that is designed to for providing a standard virtual teaching learning environment and as well as improving school management system.

Many studies have shown that without a well defined policy in long term and short term basis concurrently, and without a sustainable professional development mixed with an standard virtual content and curriculum and also without a close monitoring and evaluation, smart schools programs would not be able to provide sufficient educational service to students and these projects will eventually lead to failure than the progress. In this reason, The UNESCO program involves sustainable ICT integration at all levels of the educational process especially for the development of smart schools in developing countries [14]. One of the most important problems of e smart schools that was observed was related to the course content .In spite of the intense consideration raised from the proposed framework, the course content of the current system is not considered related to the most important needs of the standard smart schools. Smart schools could not adapt themselves to the standard needs of teaching –learning processes and this problem still exists in educational contents of these schools. Still there are old course contents in the form of the new methods of presentation and they are not able to change the education of the students fundamentally. This problem may arise from the fact that there is not any definitive definition for the objectives of virtual education needed for smart schools.

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