Pedagogy 21 Century from Perspective *Information and Communication Technology* (ICT): The Application in Learning

Hazrul Affendi Mohmad Razali

Kolej Islam Teknologi Antarabangsa

Email: hazrulaffendi@gmail.com

Abstract: The use of *Information and Communication Technology* (ICT) has provided great benefits in many fields including education. Lifestyle changes and the need to make the teaching and learning process more interesting and effective have driven the application of ICT in teaching. This paper aims to explain the influence of teacher knowledge and the process of implementing ICT in teaching. This process of implementing ICT requires teachers to be constantly aware and competitive with the changes that occur in teaching and learning. The impact of this paper is the change in teachers 'attitudes towards the need for ICT applications in teaching and teachers' thinking to cope with ever-changing technology.

Keywords: pedagogy, 21 century, information and communication technology, learning

1. Introduction

Information and Communication Technology (ICT) as a variety of tools and systems used to process, manage, manipulate, store, transfer and disseminate information through electronic media (Melvina and Jamaludin, 2010). The importance of educational technology in educational institutions in Malaysia has been debated since 1970. The development of this educational technology is divided into three stages. First, the pre- and post-independence era began to use visual and visual materials. Second, it was from 1972 to 1979 that the media started to use communication, radio, and television in education. Third, the 1980s to 1990s were the developmental period of resource-based teaching and computer education (Joseph, 1998).

The use of technology in education is increasingly needed when the Ministry of Education (MOE) introduced the concept of Smart School in 1997. The newly introduced Smart School was fully redesigned in terms of teaching, learning and school management (Hawa, 1997). Among the focus of the Smart School is the widespread use of computer technology in teaching, learning, and management (Kementrian Pendidikan Malaysia, 1997).

In 1999, 84 schools were pioneered for the Smart School project (Kumpulan Projek Sekolah Bestari, 1997). Smart School is defined by the Kumpulan Projek Sekolah Bestari (1997) as an educational institution that practices teaching and learning and school management that prepares students for the technological age of education. According to the Ministry of Education Malaysia (2003), there are five major steps

taken to safeguard the school namely Smart School concept, computer lab preparation, science, and math teaching in English, TV education and School Net facilities provision.

Teachers are given the opportunity to enhance their skills in the areas of technology use in teaching and learning through this smart school project. Therefore, teachers' skills in communicating content using technology are essential. Emphasis is also placed on the training of teachers who focus on three important skills (Multimedia Development Corporation, 2005).:

a. Understanding and management of technology
b. Design and manage students in the learning environment through the use of information and communication technologies.
c. Manage social, ethical and humanitarian issues within the technology use environment.

Changes in the educational system are a form of educational revolution aimed at improving and enhancing the ability of the education system to meet current needs and challenges in the future (Mohd & Zahid, et al 1993). In line with current technological developments, MOE has introduced Information and Communication Technology (ICT) in education as one of the main focuses in the development of education during the National Vision Policy 2001 - 2010 (KPM 2001). While in Indonesia, the development of technology in education started from 1970 to 1972. The University of Indonesia (UI) is one of the leading colleges in the introduction of technology in the education system in Indonesia (Fakultas Teknik Universitas Tanjungpura Pontianak, 2015).

In 1986 a network connecting several major campuses located in Indonesia consisted of Indonesia University (UI), Bandung Institute of Technology (ITB), Elephant University (UGM), Surabaya Institute of Technology Ninth (ITS), Hasanuddin University (UNHAS), Open University and Directorate of Higher Education (Dikti), and Department of Education and Culture (Depdikbud). This large network is called UNINET (Fakultas Teknik Universitas Tanjungpura Pontianak 2015).

2. Influence Of Teacher For Student Performance

Teaching and learning is a process of knowledge transfer involving teachers and students. Baba (2009) explained that there are generally a variety of factors that contribute to student achievement. He noted that there are three basic principles that are directly related to and are said to be the main factors that influence student performance, the students, the teachers and the materials or methods used by the teachers. Arifin and Mustapa (2014) emphasize that the effectiveness of teaching and learning that is often reflected in student achievement is actually dependent on the quality of teaching teachers. Teachers are an important element of the teaching and learning process. Although the world of education today has undergone many changes, the elements of education are still needed in education (Mat and Soon 2010).

According to Madar et. al (2005) and Zainudin (2012) lecturer factors are factors that influence students' graduation. Muda and Azmi (2017), in turn, found that lecturer factors are the dominant factor in influencing student achievement. Arifin and Mustapa

(2014) emphasize that the effectiveness of teaching and learning that is often reflected in student achievement actually depends on the quality of teaching. Measurement of the quality of Arabic language teachers should be viewed in four dimensions simultaneously namely teacher qualifications, teacher characteristics, teacher practices, and student output. Based on some of these studies, it is evident that the factor of lecturer or teacher is one of the important factors that influence student achievement.

3. Teacher Knowledge

Teacher knowledge is one of the most important and influential aspects of teaching and learning (Rahman 2007). According to Shulman (1987), the knowledge base is divided into seven categories, namely content knowledge, general pedagogical knowledge, curriculum knowledge, content pedagogical knowledge, student knowledge, knowledge in educational context and knowledge of educational goals, objectives, values, philosophy and the basis of history.

Based on these seven basic categories of knowledge, it is found that content knowledge is the first thing a teacher needs to pay attention to. This indicates that teachers or educators need to have some knowledge of what to teach. Shulman (1986) also argues that knowledge of a subject is related to a particular understanding of the subject as a discipline. In addition, teachers must master pedagogical knowledge as pedagogy is one of the most important aspects of educational practice (Webb and Cox 2004). According to Grossman (1990), there are four general categories of teacher knowledge based on work on professional knowledge teaching namely general pedagogical knowledge, content knowledge, content pedagogical knowledge (PCK) and contextual knowledge. All of this knowledge interacts with one another to form a good teacher and to perform the functions of an effective teacher.

Pedagogy is an extensive knowledge of teaching and learning processes, classroom management, school organization, school curriculum, teaching behavior, teacher-student interaction and more. This means that teacher pedagogical knowledge plays an important role in developing students' abilities and potential. According to Samsuiman et al. (2014) quality teaching is derived from teachers who are capable of applying pedagogical knowledge which is science teaching informal education. Pedagogical knowledge or teaching skills need to be mastered as teachers will be more likely to choose and use teaching methods appropriate to the student's level of acceptance (Augustine, 2019).

Looking at the current developments, it has been found that Information and Communication Technology (ICT) has become a key catalyst for disseminating and storing information and helping students build new knowledge (Lechner and Boli 2000). In addition, the use of ICT can also help teachers to use teaching materials in highly engaging forms (Intel Education, 2007).

Thus, to make the learning environment at school more sophisticated, futuristic and adaptable to the changing age of information technology, teacher teaching is more engaging and effective, students can better understand the concepts taught, improve the quality of the learning environment and improve student achievement, teachers need to

master and improve the use of ICT in teaching and learning (Duffy et al. 2003., Jamaludin dan Hashimah., 2009., Rozhan 2009., Safuan dan Fong 2003., Ismail and Subkhi 2010).

4. ICT Receiving Process In Education

The use of ICT in teaching should be planned so that the original objectives of the teaching are not misplaced. The integration of teacher knowledge is essential for effective teaching and learning processes. Teachers not only need to master the content they want to teach and pedagogy, but teachers also need to know ICT.

Knowledge integration of these three elements has created the Knowledge Pedagogical Technology Knowledge model. This model is based on the original idea of the Content Pedagogical Knowledge model introduced by Shulman (1987, 1986). According to Mishra and Koehler (2006), this Knowledge model of content pedagogy is a basic model that refers to the knowledge and understanding that teachers need to integrate technology into teaching and learning effectively. This model highlights three key components: technology content, pedagogy, and content. As a result of the interaction of the components contained in Content Content Pedagogical Technology, these four main knowledge components are (1) Content Knowledge; (2) Knowledge of Soil Technology; (3) Knowledge of Content Pedagogy, and (4) Knowledge of Content Pedagogy Technology (AACTE, 2008).

According to Mishra and Koehler (2006) based on this model, the components of Content Pedagogical Technology Knowledge are divided into seven components namely (1) Technology Knowledge; (2) Content Knowledge; (3) Pedagogical Knowledge; (4) Content Pedagogical Knowledge; (5) Knowledge of Content Technology; (6) Knowledge of Pedagogical Technology and (7) Knowledge of Content Pedagogy Technology. These components are defined by Denise et al. (2010) as follows:

a. Knowledge Technology refers to knowledge of technology including digital technologies such as the internet, digital video, interactive whiteboards, and computer software.
b. Content Knowledge refers to the actual knowledge of the content of the lesson to be learned or taught.
c. Pedagogical Knowledge refers to teaching methods or processes including knowledge of classroom management, assignment assessment, lesson plans, and classroom teaching.
d. Content Pedagogy Knowledge refers to Content Knowledge related to the teaching process. Content Pedagogy Knowledge is different from other components because it is a combination of content and pedagogy with the aim of achieving better teaching practice.
e. Content Technology Knowledge refers to knowledge of how technology can be used to deliver teaching content.
f. Knowledge of Pedagogical Technology refers to knowledge of how technology is applied to teaching and learning and the understanding that using technology can diversify teaching techniques.

g. Content Pedagogy Technology Knowledge refers to the knowledge that teachers need to integrate technology using the content of the subject matter taught in teaching and learning.

5. Conclusion

Kirkman (2000) states that teachers' skills in using ICT in teaching influence the implementation of ICT policies in school education. Teachers who are not proficient in ICT will affect the implementation of ICT in education. Teachers not only need to enhance their skills in ICT but also need to be able to diversify their teaching methods so that the level of student literacy can be enhanced (Loveless at al., 2006).

The Integration of information technology is a strategy to integrate and enhance the use of such tools in the teaching and learning process and in all school matters. Using information technology is an issue that is closely linked to effective planning and implementation. The use of ICT in education includes how information technology is used in the classroom context and the ongoing interaction between teachers, students, and ICT (Saadiah & Ngah, 2003). In the context of teaching, information technology is used as a presentation and demonstration tool. In the context of learning, the use of information technology in teaching and learning can be categorized as tutorials, explorations, applications, and communications (Saadiah & Ngah, 2003).

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