INFORMATION TECHNOLOGY LITERACY AND BASIC COMPUTER COMPETENCY OF SECONDARY SCHOOL TEACHERS

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การใช้เทคโนโลยีสารสนเทศและคอมพิวเตอร์ช่วยสอนในโรงเรียนเพื่อเพิ่มประสิทธิภาพการเรียนการสอนในชั้นเรียนได้รับการยอมรับอย่างกว้างขวางในประเทศไทย ปัจจุบันนักเรียนจำนวนมากมีความสามารถในการใช้อุปกรณ์คอมพิวเตอร์ในระดับค่อนข้างสูง ดังนั้นครูผู้สอนจึงควรพัฒนาศักยภาพในเรื่องเทคโนโลยีสารสนเทศและทักษะในการใช้คอมพิวเตอร์นอกเหนือจากความรู้ทางวิชาการเพียงอย่างเดียว การศึกษานี้มีวัตถุประสงค์เพื่อประเมินความสามารถทางเทคโนโลยีสารสนเทศของครูโรงเรียนมัธยม โดยพิจารณาถึงเจตคติต่อการใช้เทคโนโลยีดังกล่าวภายในโรงเรียนรวมถึงประเมินสมรรถนะการใช้อุปกรณ์คอมพิวเตอร์พื้นฐานของครูแต่ละคน เครื่องมือที่ใช้ในการเก็บข้อมูลประกอบด้วย (1) การสัมภาษณ์แบบมีโครงสร้าง (2) แบบสอบถามเจตคติต่อการใช้เทคโนโลยีสารสนเทศและคอมพิวเตอร์ของครูโรงเรียนมัธยม (3) การประเมินทักษะคอมพิวเตอร์โดยรวมแบบอิงงานปฏิบัติในการสอนของครูแต่ละคน โดยเก็บรวบรวมข้อมูลจากครูโรงเรียนมัธยม 15 คนที่สังกัดโรงเรียนสาธิต 3 แห่ง ในจังหวัดกรุงเทพฯ ผลการวิเคราะห์ข้อมูลเชิงคุณภาพพบว่ากลุ่มตัวอย่าง (1) มีความสามารถทางเทคโนโลยีสารสนเทศในระดับดี (2) มีเจตคติในเชิงบวกต่อการใช้เทคโนโลยีสารสนเทศภายในโรงเรียนและ (3) มีสมรรถนะการใช้อุปกรณ์คอมพิวเตอร์ในระดับดี เครื่องมือที่ใช้ในการวิจัยครั้งนี้สามารถนำไปประยุกต์ใช้ในการประเมินทักษะคอมพิวเตอร์เบื้องต้นของครูโรงเรียนมัธยมทั่วไปได้เป็นอย่างดี สามารถนำไปจัดอบรมเพื่อพัฒนาศักยภาพในเชิงวิชาชีพให้กับบุคลากรภายในโรงเรียนได้

Abstract

It has been widely recognized that Information Technology (IT) and Computer- Assisted Instruction (CAI) are currently used in most schools in Thailand to support classroom teaching. Whilst the secondary school students have access to information technology and are capable of using computers at a relatively high

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level, their teachers should possess both IT literacy and computer skills in addition to their general academic qualifications. This study aims to assess IT literacy of secondary school teachers, to study their attitudes toward the use of IT in their school context, and to assess their basic computer competency. The researcher developed three instruments to collect data: (1) structured interview for IT literacy of the subjects, (2) questionnaire on their attitudes toward IT and computer use, (3) and task-based assessment of computer skills generally required in their teaching. The researcher collected data from fifteen secondary school teachers in three demonstration schools in Bangkok. An analysis of obtained qualitative and quantitative data pointed to (1) the subjects' good to very good level of IT literacy level, (2) their positive attitudes toward the use of IT in their school context, and (3) their good level of basic computer competency. As for pedagogic implications of the study, the research tools can be used by secondary schools for basic computer skill assessment or for teaching staff training as part of the school's professional development.

1. Introduction

This paper deals with basic computer competency and Information Technology (IT) literacy of secondary school teachers. It addresses their computer literacy, attitudes toward IT, and computer skills in their teaching environment. From computer technology development history, it has been accepted without dispute that the computer is essential to communication in social life and particularly education since the first personal computer (PC) was invented about forty years ago (Kopplin, 2002). The use of computers creates effective work and saves time and human resources. In the past half-century, technology has been developed by the combination of computer and communication technologies known as Information and Communication Technology or ICT (Malaiwong, 2008). People have therefore realized and used this technology globally. The very large and expensive mainframe was finally developed into a smaller personal computer which was portable and affordable as an electric appliance to most people (Paireiw, 2008). In 1983, the Internet, a global system of interconnected computer networks using the standard Internet Protocol to serve billions of

users worldwide was created and quickly became the most widely used network protocol in the world (Kapor, 1993). It is certain that such IT developments have impacts on how people communicate, process information, and most importantly learn in their specific educational contexts (Thatchayapong, 1998 and Srithanya, 2009).

As known, the majority of educators use IT as part of their instruction and for realizing learning activities in and outside the classroom (Ratanakumpang, 2005). There have been computer functions called CAI (Computer-Assisted Instruction), and specific computer skills required of teachers in facilitating and supporting their work. Computer for education involves four categories: (1) Computer for Educational Administration; for example, to manage all schools and educational facilities (2) Computer for Educational Service or Computer Managed Instruction; for example, to utilize the computer's branching, storage and retrieval capabilities to organize instruction and track students' progress (3) Computer Literacy, the ability to operate a computer and to understand the language used in working with a specific system or systems; for examples, to use computers to search for information or

to use a computerized database to store students information, and (4) Computer Assisted Instruction; for example, it is possible to individualize learning while giving immediate reinforcement and feedback. (Taylor, 1980)

2. Rationale and Background of the Study

This research focuses on secondary school teachers who have to cope with computer literate students. They need to be able to use IT in teaching and computer-assisted instruction as a tool in teaching management as outlined in the national agenda 2008-2012 by the Ministry of Education, Thailand (Office of the Education Council, 2008). The IT agenda requires that IT be a tool for teachers to enhance the quality and efficiency of teaching, self-directed learning via information search, and supports life-long learning for Thai citizens.

In the past decades, quite a few studies reported research findings in science teaching that computer literacy of science teachers seems to increase their computer use in instruction (Beaudin 2001, Beaudin & Grigg, 2001, Thomas 2001, Ocak & Akdemir, 2008). These researchers were in support of the use of computers in the classroom, particu-

larly for science instruction. It was pointed out that teachers' lack of computer skills could impede quality instruction and deprive students of learning opportunities. Some researchers have identified causes for insufficient IT skills in teachers as stemming from limited access to equipment and lack of training, and recommended necessary training to alleviate identified shortcomings (Bosh & Cardinale 1993, John 2004, Okojie et al. 2006). In the Thai instructional context from previous research, a number of teachers seem to be under pressure in becoming IT literate at the functional level to be able to work efficiently in their school environment Pimros (2003).

Considering all expectations imposed on teachers regarding their functional IT literacy and computer skills required in their school work, the researcher felt the need to study IT literacy of secondary school teachers and their mastery of required computer skills. Without identified IT limitations on an empirical basis, it would definitely be unlikely to provide assistance and training as needed by teachers. Since teachers at the secondary school level need to possess functional IT literacy and skills in computer used for instruc-

tion, not to mention basic electronic communication channel with their students via the Internet. For this reason, secondary school teachers should be an appropriate subject for research. This is to secure necessary information for teacher training in the most needed area at the moment: teachers' IT literacy, attitudes towards the use of IT and their actual computer skills at work.

3. Objectives

The study aims to secure information on secondary school teachers' attitudes toward the use of IT in their school context, and assess their basic computer competency level through an interview for their IT literacy.

4. Research Methodology
4.1 Subjects

The study uses Purposive Sampling of Nonprobability Sampling Technique. The subjects were fifteen teachers in Mattayomsuksa 1-6 [or grades 7-12] from three demonstrated schools located in Bangkok. These schools are managed by the Faculty of Education in large government universities that provide for their teaching staff with computers and Internet connection facilities. The teachers who volunteered

to participate in the study taught various subjects. The researcher arranged for meetings to collect data at the date and time convenient to them.

4.2 Instruments

The researcher developed three assessment tools based on the research objectives: (1) structured interview for IT literacy of the subjects, (2) questionnaire on their attitudes toward IT and computer use, (3) and task-based assessment of computer skills generally required in their teaching.

The samples of instruments are attached.

4.2.1 Information Technology Literacy Assessment Tool

There are two parts in this assessment tool:

Part One: A brief questionnaire asking for general information of the teachers in multiple choice format and open-ended questions

Part Two: A structured interview regarding IT literacy. The researcher conducted interviews with teachers in four areas:

(1) The general knowledge and understanding of information technology and communications

(2) Communication by Electronic Mail (e-mail)

(3) The IT and computer related ethical issues, privacy rights, intellectual property rights and related laws

(4) The potential of computers and related technology.

4.2.2 Teachers' Attitude Assessment Tool

A list of items on teachers' attitude toward IT literacy, their computer skills and related issues is on a Likert-based scale 1 (low or least agreed) - 5 (high or strongly agreed) (Likert, 1932). There are two parts in this assessment tool:

Part One: The subjects are to rate their satisfaction on computer in teaching and personal use, security, confidence to use, information and communication use

Part Two: The subjects are to identify their problems incurred while using IT; the problems in terms of obstacles to their use of computer. The participating teachers were to identify their levels of agreement to given statements on attitudes toward IT literacy, their use of computer for instruction, the problems and related areas of concern.

4.2.3 Computer Skills Assessment Tool

There are four tasks on computer competency in the form of skill-

based functions regardless versions or Microsoft Word programs. The computer-skill-based tasks are:

(1) Typing document with the use of Microsoft Word

(2) Performing basic calculations with the use of Microsoft Excel

(3) Producing a presentation with the use of Microsoft PowerPoint

(4) Searching, storing, retrieving and displaying information with the use of digital memory devices and printer

The researcher administered the four tests and observed the subjects when performing on the tests in the given time of 60 minutes. The researcher assessed the completed tasks with specific criteria at three levels of computer skills: high, moderate and need improvement.

5. Data Collection Procedure

The researcher arranged with all participating subjects for appointments according to the date and time convenient to them. In each interview session, a voice recorder was used with permission from the interviewed teachers. The researcher also took notes on important data in the subjects' responses.

As for sessions on computer skills

assessment, each subject was provided with a computer to perform four computer tasks in the time limit of one hour as follows:

(1) Typing document - Microsoft Word – 15 minutes

The basic features the subjects were asked to perform are Page Setup, Font, Underline, Bold, Numbering, Bullets, Header, Footnote, Page Numbering, Text Alignment, Table Setup, and Typing according to the given sample.

(2) Performing basic calculations - Microsoft Excel – 15 minutes

The basic features the subjects were asked to perform are Table Setup, Numbering, Font, Merge Cells, Text Alignment, Sort, Sum, Average and Typing according to the given sample.

(3) Producing a presentation - Microsoft PowerPoint – 15 minutes

The basic features of four slides the subjects were asked to perform are Title, Text, Bullets, Table Setup, Graphic Design, Picture Insert, Free Style Design, Animation - Automatic Transitional, and Typing according to the given sample in free form.

(4) Information Management – 15 minutes

The basic features the subjects were asked to perform are Searching,

Storing, Retrieving, and Displaying information with the use of digital memory devices and Printer.

The researcher monitored each session and collected finished work done by the subjects for scaling level assessment.

6. Results of the Study

The results of the study are reported in the order of the research objectives as follows:

6.1 Information Technology Literacy

From the subjects' responses to the brief questionnaire and structured interviews as their perception data, the subjects claimed that they could handle well Microsoft Word, Excel, PowerPoint and the Internet.

All fifteen subjects identified their IT literacy at the Good to Very good level. They were well aware of the i mportance of IT. They used the Internet for communication and information search, and respected intellectual property rights. They were in full support of law enforcement on IT abusive actions and privacy rights.

6.2. Attitudes towards IT

The subjects strongly agreed that computer was very useful in their teach-ing. They were very satisfied with their computer work in school and in daily life. They felt rather confident in their computer use in the classroom or in public. They tended to resort to the use of computer for information search, and computer was an essential tool in their teaching.

The subjects agreed that people should be responsible for their fault actions in computer use. They found hardware-related, software and technical problems seldom causing problems to their computer use; they might be worried with these types of problems, if encountered. The subjects often asked for assistance from IT specialists or friends to solve their IT problems. To the subjects, they could take good care of their own computers, but might need help to handle computer virus threats. They were quite satisfied with the speed of Internet connection. From all subjects' overall responses, they were very positive about IT and needed functional computer skills for their teach-ing. They felt rather comfortable with their computer use and admitted that they were only worried about computer virus threats.

Here are some excerpts from the subjects' responses regarding their com-

puter and IT problems:

"When I received an email like junk mail from a stranger with some weird messages, firstly, I thought that it was just a scam, but I heard that if you open the attached file, the virus will hit the computer. My trust of unknown people's emails is gone."

"I can't fix the virus problem by myself, I don't know how to fix the computer so I have to call technician or friend for help."

"I have to consider first whether the messages I received will harm anyone or not, if not, I might forward to friends, if so, I will delete it."

"The chained emails are very annoying. I'll delete it right away."

6.3 Computer Skills

From all four computer task-based assessments, the subjects could perform on assigned typing tasks on Microsoft Word at a good level and they completed 73% of the tasks in time. The subjects used Microsoft Excel for data entry and basic calculation at a need improvement level; they could not complete the tasks as directed. As for their performance on Power Point, the subjects produced their presentation task at a very good level. Their skills in information management were at a very good

level. The subjects were able to search, store and retrieve the information on a hard disc and a flash drive and all were able to perform the printing function without difficulty.

7. Conclusion and Implications of the Study

As seen from the results of the study, the subjects perceived their IT literacy at a good to very good level, and had sufficient computer skills to perform their IT functions at work. Considering the subjects' computer skills as required in their teaching-learning activities, we can see that these subjects as secondary school teachers still need more in-depth training in application programs related to their teaching subjects especially data entry/ retrieval and basic calculation. In addition, they may need more practice to be more advanced in producing presentations programs for their instruction. In fact all these computer skills are matters of use and regular practice will enable teachers to gain competency or higher-level mastery. The use of assessment tools as shown in the study can certainly assist secondary school administrators to identify and pay good attention to functional computer skills of their staff members. All teachers definitely

need good IT skills to be able to provide quality instruction to their students and this is undoubtedly the school's respon- sibility to help teachers to possess good computer skills required for effective teaching at all educational levels.

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