Assessing ICT Diffusion in Rural Secondary School of Thailand

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ABSTRACT
The purpose of this paper is to present a research study that assesses the ICT diffusion in the secondary school located in the rural area of Thailand. The study explores the ICT diffusion in rural secondary school and assesses the teachers’ satisfaction from using ICT in the classroom. This study used quantitative data. Data were collected from teachers in the secondary school from rural area of Nakhon Si Thammarat. The results found that there is significant relationship between teachers’ attitude level toward diffusion of ICT which can increase teachers’ competency. The teachers were satisfied of using ICT in the classroom and they suggested that the government should provide training courses for all teachers who use ICT in the classroom.

Keyword: Diffusion ICT, Teachers’ competency, Teachers’ attitude, Teachers’satisfaction

I. INTRODUCTION
Many year ago, Information and Communication Technology (ICT) has been considered as an important element for economic growth and social development (Ferrer, 2009). ICT incorporated in ever more aspects of our lives with transformative impact such as business processing, education, mobile phone, government and healthcare for improving the people life. ICTs are tools that facilitate communication and the processing and transmission of information and the sharing of knowledge by electronic means (UNDESA-GAID, 2009). The information and communication technologies (ICTs) has led to a technical disparity. What exists today cannot only be confined to computer or Internet use; but that it also refers to infrastructural problems, like the accessibility and the benefits of ICT to improve education of people who live in rural community. Ever since the growth of ICT since the last two decades, there have been numerous studies on modelling and diffusion of ICT innovation (Roger, 1997).

Roger (1997) states that diffusion is the process by which an innovation is communicated through certain channels over time among the member of a social system. Diffusion is special types of communication concerned with the spread of messages that are perceived as new ideas. There are four main elements in the diffusion of new ideas, that is, innovation, communication channels, time and the social system. Innovation is an idea, practice or object that is perceived as new by an individual or other unit of adoption. The communication is the process by which participants create and share information with one another in order to reach a mutual understanding. The time dimension is involved in diffusion in three ways, which is, innovation-decisions process, innovativeness of an individual or other unit of adoption and rate of adoption. The social system is defined as a set of interrelated units that are engaged in joint problem solving to accomplish a common goal. The social system constitutes a boundary within which an innovation diffuses, and how the system’s social structure affects diffusion has been studied. The social system focuses on the opinion, leadership, attitude, knowledge and the behavior of people who are using ICT (Rogers, 1971). Some authors revised the definitions of the DOI as it seeks to explain how innovations are taken up in a population. An innovation is an idea, behavior, or object that is perceived as new by its audience (Robinson, 2009). The main objective of the diffusion model (DOI) is to describe a pattern of spread of innovation among potential adopters in terms of a mathematical function of time (Arkadiusz & Tomasz, 2010).

Meanwhile, ICTs are important in education also, according to UNESCO (2013) ICTs in education have education model that employs ICTS to support, enhance and enable the delivery of education. For instance, ICT can help in creating a more sustainable and accessible system through improved learning and teaching capabilities. Educators and students can enjoy the benefits of improved content quality, management, and delivery for a richer learning experience (UNESCO (2012). Same as Thailand, Thai government emphasizes on ICT in education. Thai government provides the ICT infrastructure for all education level but the problem is still occurs because 70 percent of Thai people live in rural area. Then, there are inadequate budget allocation for distribute ICT in rural school in Thailand and sometime, the teachers have to spend more time for learning about ICT.
Therefore, this paper tries to explore the diffusion of ICT in rural secondary school. The study is also assessing the teachers’ satisfaction from using ICT. The research questions driving this study are as follow:

1) Does teachers’ attitude towards the diffusion of ICT have influence his/her level of competency?
2) Are competent teachers able to teach efficiently?
3) Does the diffusion of ICT in the classroom have increased teachers’ satisfaction?

The research questions would find answers to teachers’ attitude on diffusion of ICT, its effect on the level of competency, efficiency in teaching and increased teachers’ satisfaction. There are five parts to this paper. Firstly, in the introduction, a brief description of ICT diffusion is given. This is followed by the problem statement and the objectives of the study. Secondly, the review of literature describes the ICT diffusion, ICT in education in Thailand and teachers’ satisfaction. Thirdly, the research method is presented along with the data analysis technique. Fourthly, a brief discussion and summary of findings are presented. Finally, the paper concludes with recommendation for future research.

A. PROBLEM STATEMENT

In Thailand, the school is being transformed into a centre for the diffusion of technology, specifically in poor communities. Much of the technological innovations that are not available either at home or in other community spaces are accessible through the school. Therefore, all teachers in rural secondary schools of Thailand need to learn how to use computer and how to teach the children by using computer as tools in the classroom. So it is difficult to diffuse ICT in rural secondary schools because they have a long period of teaching amounting to 18 hours per day (http://www.sobkroo.com) hence more time is needed for training in ICT. This phenomenon can be viewed as a big problem for Thai education especially in rural area. Since, in rural area sometime have got the problem of teachers such as the secondary school in rural area have only one teacher who have responsibility about computer subject, and computer lab. Therefore, the teachers do not have time to learn information and new knowledge.

In addition, the studies have identified the wide gaps in the use of ICTs between urban and rural secondary schools, with insufficient and inadequate computer and other ICT tools such as network tools, poor internet connectivity, inadequate manpower, and no coherent ICT policy framework (Aduwa-Qgiegbaen & Iyamu,
2005; Amenyedzi and Iartey, 2011). Thailand also have the problem about the teachers ‘qualification because some teacher does not meet the qualifications graduates then it made the weak tools and teaching method in the classroom. Since, the teachers who response about computer subject have only computer training course certificate. The classroom cannot meet the goal of computer teaching. The Ministry of Education was unable to find a teacher who meets the educational qualifications to teach shortage subjects at all because the teachers would have to teach the next instruction. Thus this study would like to assess the success factor of ICT diffusion of innovation in the rural secondary schools in Thailand and the teachers’ satisfaction of using ICT in rural secondary school.

B. OBJECTIVES OF RESEARCH

Based on the problems statement there are two objectives as follow:
1) To examine the relationship between teachers’ attitude and competency with ICT diffusion in rural secondary school; and
2) To assess the teachers’ satisfaction from using ICT in the classroom.

II. LITERATURE REVIEW

A. ICT Diffusion

Nowadays, the ICT innovations are integrating into teaching activities in the education system. Since, innovation is the key to success in every sphere of life, changes are happening in everyday life and one has to adapt to new situations and challenges.

The education system can apply innovation into the form of diffusion of ICT innovation. The education system can gradually dig out innovation acceptance enablers, under reasonable legal agreements, and help teachers reproduce their own version of digital teaching materials through education resource sharing platforms. This mechanism will increase the popularity of integrating ICT innovation into teaching activities and make it operate continuously (Vivekananthamoorothy et al, 2009).

Hisham (2009) states that diffusion of ICT innovation presents information which is important for decision makers to define education’s potential students, service area, core competencies and other aspects necessary for an integrated ICT adoption strategy. Diffusion of ICT innovation is most important for learning and growth of people in the real world. Since ICTs have been greatly empowered people believe that they can compete in the global knowledge-based economy.
because they know that their knowledge, ideas, culture and passions are as valuable as any in the world (infoDev, 2010).

In addition, diffusion of ICT innovation in the education system has been of paramount important. It is a contributing factor to meaningful participation in the knowledge society in which education forms the fundamental element (Jime, 2010).

In rural contexts, many people see technology as an opportunity to overcome the barriers of geographic isolation experienced by these kinds of communities, offering them new opportunities for education and employment, and access to knowledge and communication with other people. One potential opportunity for addressing weakness of teaching and pedagogy is to augment educational delivery with appropriate use of information and communication technologies (Anderson et al, 2012).

B. ICTs in Thai educational system

In the face of global social and economic challenges, many governments around the world are looking to reform their educational system to prepare students for the 21st century. Similarly, Thai government focuses on the use of ICT to improve access to education and the outcome is seen as central to the advancement of Thai society and has been enshrined in the education of Thailand. Thai government has provided the two visions of education for Thai people. The first vision of education for Thailand is enabling future education with ICT (ICT Master Plan 2011-2013).

What this mean is that ICT is crucial to the development of all Thai citizens and in this regards requires careful and serious consideration of the issues surrounding its development, introduction and use (Ministry of Education of Thailand, 2011).

The second vision of education for Thai people is the implementation of technology in education. It is believed that learning technologies will improve access to educational opportunities and improve outcomes for Thai students in the 21st century. A key aim is to transform Thai society into a learning society, able to take advantage of the opportunities available by connecting with the global knowledge economy, while gaining a greater understanding and appreciation of Thai culture and society. The learner is at the centre of these education reforms (Ainley et al., 2010).

However, Thailand is a big country and the formal education has four major sequential levels: pre-primary education, primary education, secondary education and higher education. Pre-primary education means students are offered a two-year course in public pre-primary schools and a three-year course in private pre-primary education aims to nurture and prepare physical, mental, intellectual and emotional skills for students for their further movement to the primary education. Apart from primary schools and kindergartens, pre-primary education is also provided with Child Care Centres and Child Development Centres, depending on the target groups and their local areas. While primary education means, students undergo at last six years of primary education as a compulsory education. Primary education puts emphasis on basic literacy and numeracy skills and cultivates desirable behaviour in students. Secondary primary is divided into two levels; lower and upper secondary levels. Lower secondary education offers a three-year course which is geared toward developing the students’ ethics, knowledge and abilities. It allows the students to explore their needs, areas of interests and aptitudes and enables them to meet their appropriate careers. Upper secondary education is a three-year course as a fundamental stage for students who will proceed to higher education. It also aims to prepare student to meet the labour market and to promote their entrepreneurship skills. There are two streams; vocational-oriented is provided in vocational and technical colleges for the students who are good at skills while academic stream is offered for general education schools for students who are academically inclined. Higher education is a post-secondary education which is divided into two levels; diploma and degree levels (Ministry of Education Thailand, 2011).

The Thai educational system has been implemented in both urban and rural areas. The Thai government has to support most Thai educational system in urban schools and rural schools. However, as mentioned previously Thailand is a big country with 66 million people, but 70 per cent of people live in rural area (ICT master plan 2011-2013). Therefore, this study is appropriate to focus on the educational system in rural area since the diffusion of ICT innovation can bring enormous benefits to the larger underserved community residing in the rural areas.

C. Teachers’ satisfaction

The satisfaction concept was originally introduced in marketing field where it refers to customer satisfaction. Satisfaction is achieved when a customer reached his/her expectation towards the services or product given by a particular agency or company
(Kanthawongs, 2011; Ahmad et al., 2013). Customer satisfaction refers to the state of mind that customer perceived about a company when their expectation have been reached or exceeded over the lifetime of the product or service. This study however emphasizes on the teachers’ satisfaction in using ICT in the classroom based on similar concept.

D. Teachers’ competency

Today, teachers need to improve knowledge and skills to enhance, improve and explore their teaching practices. Therefore, many of the studies on competencies of teacher emphasizes on the teaching role of the teachers in the classroom. Competencies means knowledge, skills, attitude, values, motivations and beliefs people need in order to be successful in the jobs. ICT competencies are based on using ICT as tools for transferring knowledge. Therefore, this study would like to investigate that teachers’ competency can be related to teaching efficiency. (Gupta, 1999; Arul & Veena, 2012).

III. RESEARCH METHODOLOGY

A. Research Design and Instrument

The study use quantitative method which survey questionnaire. The questionnaire was developed based on the author and then send to three experts to revise the questionnaire. There are two experts from information technology program and one expert from psychology program. After that these questionnaire was rewrite again based on the comments of the three experts. The questionnaire consists of three parts. First part is the demographic data, second is about the attitude of using ICT in education such as teachers’ anxiety, teachers’ confidence, and ICT benefits. The third part is about the competency of using ICT as tools for teaching in the classroom and use ICT as a supplementary for teaching in the classroom. Each part consists of 15 items. These variables were tested to be reliable as illustrated by their Cronbach alpha values of between .700 and .800 respectively.

Participants and Sampling Technique

The sample population of this study (n=968), but this selected are the teachers from rural secondary schools in Nakhon Si Thammarat Province Thailand. This study selected only the schools that are located in rural area. The reason of choosing the secondary school that located in rural area because the study would like to describe about the teachers’ satisfaction and teachers’ competency since these school are far from urban and there are inadequate budget allocation for distribute ICT in rural school. Each school has only one computer lab and only one or two computer teachers who are responsible all subject that are related to computer. Altogether 11 schools were chosen. Therefore, the sample population of this study was 55 teachers from rural secondary school.

Variable of this study

The variable of this study is based on the diffusion of ICT in secondary school, the attitude of teachers when they used ICT, the teachers’ competency and the last is on teachers’ satisfaction. The two independent variables are teachers’ attitude and teachers’ competency and one dependent variable is teachers’ satisfaction and benefits of using ICT. The Cronbach alpha values of each variable is between .700 and .800 respectively.

IV. RESULTS

To examine the teachers’ attitude, competency and satisfaction, the Pearson’s product-moment correlation coefficient as been conducted for the bivariate correlation analysis. Table 1 illustrates the education level of participants.

<table>
<thead>
<tr>
<th>Education level</th>
<th>Total</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certificate</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td>Bachelor degree</td>
<td>45</td>
<td>79.6</td>
</tr>
<tr>
<td>Master degree</td>
<td>10</td>
<td>17.9</td>
</tr>
</tbody>
</table>

There are 55 participants, with 79.6% holding bachelor degrees, 17.9% received master degrees and 1.8% has certificates.

<table>
<thead>
<tr>
<th>Experiences</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>14</td>
<td>23.2</td>
</tr>
<tr>
<td>6-10</td>
<td>17</td>
<td>30.4</td>
</tr>
<tr>
<td>11-15 year</td>
<td>10</td>
<td>17.9</td>
</tr>
<tr>
<td>&gt;16 year</td>
<td>14</td>
<td>25</td>
</tr>
</tbody>
</table>

Table 2 illustrates the experience as a teacher, 25% have experience of teaching more than 16 years, while 17.9% have experience in 11-15 years. In addition, 30.4% are 6-10 years and 23.2% have 1-5 years of teaching. This study analyzed the findings based on the following hypotheses.

Hypothesis 1: Teachers’ attitude towards diffusion of ICT can increase teachers’ competency.

<table>
<thead>
<tr>
<th>Pearson Correlation</th>
<th>Attitude</th>
<th>Competency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sig. (2-tailed)</td>
<td>1</td>
<td>.374**</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
</tr>
</tbody>
</table>

Table 3 illustrates the correlation of teachers’ attitude and teachers’ competency after using ICT in the classroom as
tool and teaching in the classroom. Hypothesis 1 examined the relationship between teachers’ attitude toward diffusion ICT and teachers’ competency. The result showed that the teachers’ attitude is positively correlated to teachers’ competency toward diffusion ICT in rural secondary school. The relationship is significant at the level 0.01 level. This hypothesis is supported.

**Hypothesis 2: Teachers’ competency can increase the teaching efficiency of the teachers.**

<table>
<thead>
<tr>
<th></th>
<th>Competency</th>
<th>Teaching efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>.292</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>55</td>
<td>.031</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.292*</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.031</td>
<td>1</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
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</tbody>
</table>

Table 4 illustrates the teachers’ competency and teaching efficiency. This hypothesis explains the relationship between teachers’ competency and the teaching efficiency. The relationship is significant at the 0.031 level. This hypothesis is supported.

**Hypothesis 3: the relationship between ICT diffusion in rural secondary school and teachers’ satisfaction.**

<table>
<thead>
<tr>
<th></th>
<th>Competency</th>
<th>Teaching efficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Correlation</td>
<td>1</td>
<td>.371**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>55</td>
<td>.005</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Pearson Correlation</td>
<td>.371**</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.005</td>
<td>1</td>
</tr>
<tr>
<td>N</td>
<td>55</td>
<td>55</td>
</tr>
</tbody>
</table>

Table 5 illustrates the correlation between ICT diffusion in rural school. The hypothesis focuses on the relationship of ICT diffusion in rural secondary school and teachers’ satisfaction. The relationship is significant at the 0.05 level. This hypothesis is supported.

V. DISCUSSION

The results indicate that teachers welcome the diffusion of ICT in rural secondary schools. This means that teachers who are able to use ICT efficiently are able to perform better by teaching more efficiently. They think that ICT can increase the learning outcomes. The increased in the level of satisfaction as a result of the ICT diffusion means teachers are satisfied with ICT use in the classroom characterized by ease of use of the appropriate hardware and software to support teaching and learning. Hence it is important that proper and adequate training be given to teachers to increase their proficiency in ICT. For the relationship between teachers’ attitude towards diffusion of ICT and teachers’ competency the result indicates positive relationship between teachers’ attitude and teachers’ competency. This implies that the competency level of teachers can significantly be increased through the diffusion of ICT in the classroom. In addition, the teachers hope that if they have more training course as professional teaching, then it can increase the teaching competency. This is consistent with Bulent et al., (2009) who state that teachers who have positive attitudes toward ICT can improve their teaching competency. Therefore, diffusion ICT in rural school can motivate the teaching and learning in the classroom.

The relationship between teachers’ competency and teaching efficiency indicates a positive relationship. This implies that competent teachers who make use of ICT are able to teach more efficiently. Hence ICT can be seen as a tool that can support teaching and learning in the classroom, which in turn able to increase the competency level of teachers. Such as the teachers can use the ICT to prepare teaching method. Similarly as stated by UNESCO (2013), that ICT can increase teachers’ competency.

The results also found that the diffusion ICT in rural secondary school can make the teachers satisfied and happy when using ICT. The using of ICT in school can enhance teachers for teaching and learning classroom and also the teachers note that ICT can improve their knowledge for teaching and preparing their lessons. Mehra et al., (2013) reported that teachers tend to be more satisfied when using ICT in higher education.

VI. CONCLUSION

This study has made an attempt to assess the teachers’ competency, teachers’ attitude and teachers’ satisfaction as a result of the diffusion of ICT as an innovative tool for teaching and learning. The study found that all hypotheses were supported and are significantly related to ICT diffusion in rural secondary schools. However, further research will be needed to cover other rural areas as the sample used in this study is considered small to represent the population of rural Thai secondary schools. Therefore, the further research will be cover the rural population from the secondary school and primary school in rural area.
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