Exploring the ICT Proficiency Level among Primary and Secondary School Teachers in Lao PDR

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Abstract. This study marks an important contribution to the education section in Lao PDR concerning teacher's ICT proficiency, which aims to reflect the outcome of student teachers in each of the teacher training programs. The study is focused on how teachers perceived basic ICT application knowledge and skills. A survey was completed by 200 teachers who teach in primary and secondary schools from eight districts of Salavan province. The results show that both primary and secondary school teachers perception of basic ICT applications is different, Also that male teachers' proficiency in using ICT is higher than female teachers. In addition, how Teacher Education Institutions organize and encourage student teachers to be accomplished in promoting teaching and learning with ICT is discussed.

Keywords: exploring the proficiency in using ICT, teacher education in Lao PDR, ICT competency, ICT integration, in-service teacher, teaching and learning with ICT, Salavan TTC.

1 Introduction

Information and communication technologies (ICT) are dynamic influences in a changing society. They are increasingly influencing all aspects of life as well as at the school level. Over the last decade, more than 700 empirical research studies on the impact and effectiveness of technological education has shown that student achievements are positive [20]. ICT exists as tools which enhance and are able to solve numerous varieties of teaching and learning activities. At present, the majority of educational institutions have ICT applications in their curricula. For example, UNESCO has defined the usefulness of ICT as it can contribute to universal access to education, equity in education and the delivery of quality learning and teaching [25]. They have been running many projects with the goals to integrate ICT into teaching and learning activities, and the results of these projects show that ICT has positive effects. In 2011 more than 90% of students in primary, lower secondary and high schools in Asian countries has been instructed in basic computer skills [27]. The role of ICT in education is effective in the delivery of quality education and is becoming increasingly

consolidated. Teachers and students are faced directly with the growing and expanding digital technologies, both in society and at the school level. We have become familiar with the teaching and learning skills required for the 21st century. For example, the Partnership for 21st Century Learning (P21) has developed a framework for the skills of the learner in this century. The implementation requires the development of key academic subject knowledge and understanding among all students who must learn the essential skills for success in today's world, such as critical think, problem solving, communication and collaboration [16]. The P21's vision and mission emphasizes the skills, knowledge, values and attitudes that learning and teaching promote must reflect and respond to the needs and expectations of individuals, society, countries and the world of work today.

Teachers are the key to improving the quality of learning, they have a powerful impact on upgrading the quality of student learning experiences [26]. Teachers are faced with many challenges in integrating ICT into their teaching and learning activities. This means that the teachers' ICT literacy is critical in enabling teachers to incorporate ICT into their teaching activities. Recently many researchers have studied strategies to assist teachers to accomplish teaching and learning with ICT. Mishra and team (Mishra, 2006) insist that effective teaching is contingent upon teachers' abilities to represent and formulate the subject matter so that it is comprehensible and accessible to students. The heart of good teaching with technology has three core components, technology, pedagogy and content knowledge. On the other hand, UNESCO has been working for many years to improve and develop the quality of education by supporting and promoting teacher use of ICT for teaching and learning around the world. They believed that using ICT in education has been widely accepted, and the potential of ICT brings positive impacts to teaching and learning by providing students and teachers with flexibility, accessibility and more opportunities of participation and collaboration [24].

In Lao PDR, the government has had a recognized ICT policy in education since 1998. However, the expansion ICT in schools has been limited. Most of the ICT funding in schools and colleges was used to facilitate ICT for the educational administration. In 2011, the Ministry of Education and Sports (MoES) introduced a new ICT policy called "ICT4 Education". The goals of the new policy was to build the ICT educational infrastructure, promote ICT integration in the classroom, improve education administration and teachers' ICT knowledge and skills. The project includes eighteen ICT centers in the country with one built in every province and this work was completed in 2013. Each center consists of computer rooms, network management rooms, lecture rooms, distance learning rooms and science laboratories. Some high schools in each province have installed a computer room in which to provide the teaching and learning of ICT [14]. Concurrently, many secondary schools and Teacher Training Institutions have installed personal computers and ICT equipment [28]. All teacher training programs have integrated ICT into the curriculum, most student teachers have access to ICT facilities for learning, study and skill development purposes. However, there are around 70% of teachers in local primary schools who want to learn or improve their professional knowledge and ICT skills for teaching and learning in the classroom [11]. The current situation of teachers in all regions

of Lao PDR is that only some schools and teachers have access to ICT tools and do not have the skills to implement the MoES's policy for using new technological applications. The Teacher Training Colleges (TTCs) have the responsibility for ensuring the quality of both pre-service and in-service teachers so they have to explore into what pre-service or in-service teachers' needs are, and how to help or support them to improve and develop their knowledge and skills. According to the 2017 academic year report from the Salavan Province Education and Sports Service (PESS) there is one ICT center which helps to support the use of ICT for education in the province. For the past 5 years some teachers from primary and secondary schools have been trained in the use of ICT applications as well as basic computer and internet skills. However, many teachers still do not usually use ICT [18]. It is not clear which skills and knowledge these teachers do not have but need. Therefore, this study aims to explore what the secondary and primary school teachers' perception of ICT is. The results from this study will be conveyed directly to the TTCs in order to ensure the quality of outcomes for pre-service teachers for each course or program. The study is focused on the content of the basic knowledge and skills for the use of ICT, as well as what teachers' current knowledge or ability is in the use of computer programs such as Microsoft Office and of the use of the internet.

2   Literature review

In 2013 the Ministry of Education and Sports (MoES) implemented a new ICT policy for education. The aim of the policy is to build the ICT infrastructure for education, enhancing the quality of high school education, improving and developing the education information management systems and upgrading the human resource for using ICT in education [13]. The academic year report (2015) of the ICT Center for Education and Sports states that eighteen ICT centers had have built and were completed in 2013. Each ICT center consists of computer rooms, network management rooms, lecture rooms, distance learning rooms and science laboratories. This project aims to build the infrastructure for using ICT in education. Three projects have been carried out; the creation and development of web-based learning, a forum for promoting the learning resources online, and experimentation of teaching and learning by using video conference work with Lao teachers and students. The broadcast of teaching is form a high school in Vientiane and live to two high school in Luang Prabang and Champasack [14].

The ICT infrastructure started many years ago before the new ICT policy was implemented, but it did not expand very widely. Many secondary schools and Teacher Training Institutions had installed some personal computers and ICT equipment. For example, 122 personal computers were piloted in sixteen secondary schools which was supported in different provinces by projects such as Smart School (2001-2005) and ASEAN School Net (2003-2006). Additionally, 294 personal computers were installed in five Teacher Training Colleges (TTC) and three Teacher Training Schools (TTS). Most piloted secondary school and TTCs/TTSs have a Local Area Network

connection (LAN) and internet access. The personal computers, LCD projectors and LAN/Internet are used for teaching and learning in the ICT lab [28].

The Teacher Education Institutions (TEIs) started using ICT for teaching in 1997. The majority of teachers who work in TEIs have learnt using ICT for teaching through training workshops incorporating tape recordings, video, overhead projectors and video cameras. Teachers use ICT as a teaching tool as well, not for student learning. Formally many teachers could not use ICT equipment especially computers, only mathematics and science teachers had the opportunity to use computers and integrate them into their teaching. To build the capacity of TEIs to prepare the next generation of teacher for ICT and to enhance the quality of teaching and learning from 2001-2006, the Department of Teacher Education (DTE) organized numerous workshops on the use of computer for teaching and learning which was supported by the Project Improving Science and Mathematics Teacher Training (SMATT).

In order to pursue the improved quality of teachers in TEIs, the Department of Teacher Education (DTE) and UNESCO signed an agreement to established a three year plan (2006-2008) for the promotion of the use of ICT applications for TEIs particularly in Luangphabang TTC, Bankeun TTC and Savannakhet TTC. Many schools, institutions and universities have played a role in ICT development mainly for classroom teaching. These teachers are very active and effective in the use of ICT [28]. The development and use of ICT in education in Lao PDR has been increased rapidly since 2009. Both public and private schools have installed ICT tools to promote the quality of teaching and learning additionally many private schools have organized smart classroom [14]. The five year plan of ICT center for Education and Sports will continue to expand and to contribute computers and ICT tools into lower secondary, and primary schools [14]. MoES also proposed that 565 computer rooms will be supported for teachers in the 145 districts of Lao PDR, and at the same time principals and teachers will be trained to use those tools and applications [15].

The development of ICT in education abroad has been practiced for many years, all developed countries have promoted teacher training with ICT, they have studied various strategies for teaching and learning with ICT or how to integrate ICT into the classroom. For example, Seymour Papert (1960), [17] studied about providing computers as an instrument for learning, and enhancing creative computational thinking. At that time, many people derided him when he expounded his theories. However, he was the first to show the impact of new technologies on learning in general, his research results showed that children who has had the chance to use computers to write and to make graphics to represent geometrical and mathematics concepts had progressed rapidly in their knowledge and understanding. He is now considered the world's foremost expert on how technology can provide new ways to learn and teach mathematics, thinking in general and other disciplines [21].

In the US, from 1963 to 1985 the education sector tried and supported new technology in the classroom. At this time IBM was the first mainframe computer manufacturer to develop a PC, concurrently Apple developed the Apple Macintosh computer including computer-based tutorial and learning games. There, 25 percent of k8 and high school used PCs. Many schools used videodisc and object-oriented multimedia authoring tools, simulations, educational databases and other kinds of Comput-

er Assisted Instruction (CAI) programs which were delivered on CD-ROM disks. The use of disks helped students to save their work and data [31].

From 1993 to 1997 the internet expanded rapidly and became the world's largest database. Access to information, graphics and video streaming made it an invaluable resource for education. Accordingly Stanford Research Institute (SRI) investigated the preparation of teachers to integrate technology into the classroom. From 1995-2000 it was found that the Multimedia Project (MMP) was a powerful way to transform teaching and learning with technology, particularly in the teacher professional development program. The new teachers have developed skills both in pedagogy and instructional uses of technology [4]. Technological development, and of the introduction of the new technologies into education accelerated dramatically during the year 1990, including the combination of computation, connectivity, visual and multimedia capacities and has radically changed the potential for technologies in the school room [9].

Now the roles of ICT in education enhances the quality of teaching and learning as well as improving the learners' skills for the 21st century. These challenges are faced directly by the teacher who will organize the teaching and learning activities with the new technology applications. In recent years several researchers have attempted to develop and find out the best ways to improve and develop the teachers' ICT proficiency or teachers' ICT competency so that they will be able to integrate it into the classroom. In addition, many frameworks have appeared such as ICT-CFT (ICT framework for teacher), and TPACK (Technological Pedagogical Content Knowledge). The ICT-CFT was proposed by UNESCO (2011) and focused on improving teachers' competency in the use of ICT integration into classrooms [23]. The TPACK framework was developed by Koehler and Mishra (2006), the purpose of this framework was to encourage teachers to integrate ICT for teaching and learning. It had significant implications for teachers and teacher educators [12]. If teachers perceived in seven sub domains in TPACK, it determines that teachers are enable to integrate ICT into their teaching and learning [2].

ICTs are seen as important tools to enable and support the move from traditional teacher-centric style to more learner-centric methods [8]. The majority of teachers want to learn how to integrate ICT in the classroom effectively and efficiently [1]. Not only mastering ICT skills, but also utilizing ICT to improve teaching and learning is of great importance for teachers in performing their role as creators of effective pedagogical environments [10]. Many countries have attempted to find out ways to motivate teacher to use ICT in the classroom in the context of new curricula and pedagogies [29].

3　　Research objective and research question

This study aims to explore what the secondary and primary school teachers' perception is of the knowledge and skills used in ICT, such as the basics of using some applications of ICT including; working with the folders and files, word processing, spread sheets, power point, and the internet. In-service teachers learnt this when they

studied at the TTCs or they learnt independently. Previous studies about in-service teachers' knowledge and skills of using ICT indicated how teachers needed to improve their professional knowledge and skills but it did not represent what teachers know or their ability to use the basic ICT applications. Thus, this study has focused on what skills and knowledge the teachers have. So, the research question is;

What do teachers know of these five core skills; working with the folders and files, word processing, spread sheets, power point, and the internet?

4   Methodology

The research design for this study is based on the survey research for collecting data and describes the specific aspect of population or a portion of the population [19]. The survey was conducted to collect data, mostly quantitative, on teachers' ICT proficiency. The questionnaire was adopted from the Department of Education and Training, Western Australia which they produced by reference to the Department's teaching and learning with ICT, and other 100 schools Professional Learning Program Evaluation. It was reviewed through teachers' application of ICT [6]. It is a self-administered questionnaire which consists of two sections. Section 1 is on the demographic information of the respondents, and section 2 consists of five questions with 36 items. All items in the five questions were measured in the five-point Likert scales. It has been translated from English into Lao, and then taken to the academic council at the Salavan Teacher Training College for identifying and qualifying its context. Then utilized for a pilot test with a small group of primary school teachers, with minor amendments to the survey form to ensure comprehension and completeness. The questionnaires were distributed to 200 primary and secondary school teachers in 32 schools in eight districts of Salavan; Wapi: 37; Salavan Capital: 28; Lakhonpheng: 28; Samoi: 23; Laognam: 21; Khongsedone: 21; Taoy: 21; and Toumlan: 21 teachers. In order to interpret the information, descriptive statistics were used to find the Mean scores, Average of the Mean and Standard deviation by using the functions of the formula on the Microsoft Excel. Each of the five core skills were assessed on the questionnaire using a five point scale where 5 (Strongly agree) represents the maximum score and the 1 (Strongly disagree) represents as the minimum score.

5 Finding

5.1 The demographic of respondents

Table 1. Sample profile of the survey

Item	Demographic	Frequency	Percentage (%)
Gender	Male	81	40.5
	Female	119	59.5
Age	21 - 24	17	8.5
	25 - 29	75	37.5
	30 - 35	58	29
	35 up	50	25
Teacher training	Primary school	104	52
programs	Secondary school	96	48

The data from Table 1 shows that the number of female respondents (n = 119) 59.5%, is higher than males (n = 81) 40.5%. The age of the respondents was, 21-24 (8.5%) and then 25-29 (37.5%) while 30-29 (29%) and more than 30 years old is 25%. The number of respondents who were primary school teachers (n = 104) covered 52%, and secondary school teachers (n = 96) equal 48%.

5.2 Teachers' perception of each content

Table 2. Teachers' perceived contribution by gender

Item	Males		Females	
	Mean	SD	Mean	SD
Working with folders and files	2.71	1.62	1.90	1.24
Word processing	2.68	1.54	2.01	1.31
Spread sheet	2.38	1.5	1.83	1.6
Presentation	2.19	1.38	1.74	1.08
Internet	2.08	1.45	1.78	1.19

Table 2 shows that the Mean and SD of males and females is quite different as the males (Mean is between 2.08 – 2.71, and SD between 1.38– 1.62). The females (Mean between 1.74 – 2.01, and SD between 1.08 – 1.24). It represents that most of male teachers have the average of Mean near the middle compared to top score, however, female teachers are well below the middle.

Table 3. Teachers' perceived contribution by age

Item	21 - 24		25 - 29		30 - 35		35 Up	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Working with folders and files	2.24	1.47	2.55	1.48	2.37	1.43	1.77	1.42
Word processing	2.31	1.53	2.6	1.43	2.23	1.44	1.86	1.35
Spread sheet	2.13	1.3	2.26	1.36	2.03	1.40	1.74	1.28
Presentation	2.11	1.34	2.00	1.23	1.98	1.27	1.48	1.01
Internet	2.15	1.40	2.28	1.44	1.89	1.23	1.44	1.01

The data from Table 3 shows that the Mean and SD of teachers who are aged from 25-30 is highest (Mean is between 2.00 – 2.55, and SD between 1.23– 1.48), followed by teachers aged 21-24 (Mean between 2.11 – 2.24, and SD between 1.30 – 1.47), and teachers who aged 30-35 are similarly in the second place (Mean between 1.89 – 2.37, and SD between 1.23 – 1.44), and the lowest is teachers who aged at 35 or above (Mean between 1.44 – 1.86, and SD between 1.42 – 1.42)

Table 4. Teachers' perceived contribution by teacher training programs

Item	Primary school teachers		Secondary school teachers	
	Mean	SD	Mean	SD
Working with folders and files	1.34	0.78	2.54	1.44
Word processing	1.38	0.84	2.56	1.44
Spread sheet	1.29	0.69	2.32	1.34
Presentation	1.27	0.66	2.13	1.26
Internet	1.28	0.90	2.15	1.37

Table 4 indicates that the Mean and SD of teachers who graduated from primary school teacher programs is very low (Mean is between 1.27 – 1.38, and SD between 0.66 – 0.9). The teachers who graduated from secondary school teacher programs is higher (Mean between 2.13 – 2.56, and SD between 1.26 – 1.44). This indicates that the majority of teachers who graduated from secondary school teacher programs are more familiar with using ICT than teachers who graduated from primary school teacher programs.

6   Discussion

According to the results from Tables 1 - 4, the average of the Mean scores of each content in five parts of the questionnaire including working with the folders and files, word processing, spread sheet, power point, and the internet is highest at the middle level. Male teacher scores are higher than female teachers, the group of teachers aged between 25 – 35 is the highest, and most teachers who graduated from secondary school teacher programs is higher than those teachers who graduated from primary school programs. These results suggest that most in-service teachers perceptions of basic knowledge and skills of using ICT is low compare to the 5-point scores. It

shows that there are many teachers who do not know how to use computers, and the new technological applications. So, what happens? Even though they had have learnt to use ICT when they were student teachers, and now have easy access to the new technology their scores are still low. Referring to the results of the data from Table 1-4, it is considered that the reasons why most teachers still lack professional knowledge and skills in the use of ICT in the classroom is related to the curriculum and teaching practice of teachers in the Teacher Education Institutions (TEIs). The core curriculum of both the primary schools and secondary school programs are similar, it has placed the ICT contents, particularly using a computer into two subjects; Compute 1 and 2. Each of these subjects is taught for 32 hours. Many TEIs are still unable to fully facilitate and promote student teachers access to ICT. This corresponds to the results of the investigation from the Basic Education Quality and Access in Lao PDR or BEQUAL which represents that there are many teachers in the TEIs that cannot use ICT applications for teaching and learning. This has affected the student teachers' ability to use ICT too [3]. This situation is the basic issue which can be found in all regions of the world. For example, Gulbahar et al. (2008) surveying on the use of ICT tools in primary school for the social studies subject area in Turkey found that where teachers are willing to use ICT and are aware of the existing potential, they are still facing problem in relation to access to ICT resources and there is lack of in-service training opportunities [7]. And it similar with the results from the surveying use of ICT in education for schools in Europe represented that most teachers and students have been familiar with ICT at the classroom but only a few use it [30]. If we consider the gender, age and majors of student teachers are not influences on the teachers' perception of ICT as referred to the Teo (2008) who studied about pre-service teachers' attitude toward computer use in Singapore. He suggested that the greater level of computer experience is associated with more positive computer attitudes, however, male and female had rated themselves on their ability to use computer in significantly different ways, and female usually had a more negative attitude to computer use. He also found that student teacher who majored in different subject domains had significantly different perceptions [22].

7 Conclusion and recommendation

The findings of this study indicate that the number of teacher who lack both knowledge and skills in using ICT is still high. This situation indicates that the government or education sector has to seriously consider greater support for supplying both hardware and software into schools. Also, TTCs should consider reform and adoption of new ICT content into the curriculum to ensure the quality of pre-service teachers which will fulfill the three core subjects as well as technology, pedagogy, and content knowledge. These results also indicate that the Teacher Education Institutions should consider changes in the learning and practice of ICT to encourage a more relaxed learning environment so students can be better prepared for the digital era. In addition we have seen that most countries around the world are intent on improving and developing the quality of teaching and learning by promoting and supporting

teachers integrating the technology into their teaching and learning. However, teaching and learning with technology is quite onerous for the teacher and student as researchers have mentioned that technology is a tool which empowers and enhances the quality of education. Without technology the quality of education will decline. Thus, teachers must have the ability to integrate ICT into their teaching and learning.

The information communication and technology (ICT) has a role to enhance the quality of education. We have seen that the development of technology for education has a long history and is still progressing. At present many educational organizations are attempting to adapt and integrate ICT. These factors are a great challenge for both students and teachers in this digital era. There are plenty of technology applications and teaching and learning tools which teachers and students can use as learning resources and for skills practice. For example, many people are learning by watching video streaming on the YouTube, Facebook and other similar mediums. The result is that the learning space is unlimited, we can learn when we want and we can learn what we want. So, it is very important for the teachers and students to have access to the big data sources for lifelong learning.

The results of this study are related for both the pre-service and in-service teachers' professional knowledge and skills in integrating ICT. Reform of the educational administrations, teachers, and student teachers have to rethink about the potential of teaching and learning with ICT both in the TTCs or local schools. Therefore, this study has shown that there are a number of strategies that developed and developing countries have used successfully in their approach to the adoption and inclusion into their teacher education programs. Some countries have reformed their education system as defined the ICT policy or ICT master plan, with three or four phases. And many education institutions have determined additional strategies in their approach to ICT in education. For example, there are several studies about how to promote ICT use for both pre-service or in-service teachers in difference conditions. However, in order to solve these problems which were encountered in this study, it could be possible to endeavor to launch some theoretical ICT as well as the introduction of technological pedagogical content knowledge or TPACK framework [12]. It emphasizes teachers understanding of integrating ICT. Most researchers are insistent that the heart of good teaching with technology has three core components; technology, pedagogy and content knowledge. TPACK framework has been examined in several subject areas, and it has proved effective in enhancing the pre-service and in-service teachers to assist them in improving and developing their professional knowledge and skills. In addition, in order to improving the pre-service teachers' ICT knowledge and skills, TTCs teachers must integrate ICT exemplarily in their teaching and work with learning management systems confidently and bring their newly acquired knowledge into their classroom, and at the same time they will automatically teach their colleagues [5]

For a future study I would like to suggest, research into how to enable pre-service teachers to use and approach new technology innovatively for their learning and teaching practice. This can fulfill their knowledge and skills in integrating ICT into their coursework as well as being based on technological, pedagogical, and content knowledge or TPACK framework.

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