

# Cambodian Teacher Educators' Attitudes towards the Use of Information and Communication Technologies (ICT) in Education: Trends and Patterns

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## Abstract

The effective use of Information and Communication Technologies (ICT) can improve educational quality, especially develop the 21<sup>st</sup> century skills. Whether teachers use ICT in their teaching or not depends on their attitudes towards the use of ICT. The purposes of the study were to investigate the trends and patterns of Cambodian basic education teacher educators' attitudes towards the use of ICT. The total sample of 135 teacher educators from both Phnom Penh Teacher Education College and Battambang Teacher Education College were purposively selected to participate in the survey. The findings indicated that teacher educators had a positive attitude towards the use of ICT. They had very high intention towards the use of ICT compared to their emotion and belief. There were significant differences across gender, computer experience, and ICT training while their age did not. To enhance teacher educators' attitudes, the Ministry of Education, Youth, and Sport (MoEYS) of Cambodia should consider the provision of sufficient ICT training so as to equip them with more computer experience before being able to use it in their teaching and learning process.

## 1. Introduction

ICT is a crucial component of life in the 21<sup>st</sup> century. The development of ICT worldwide has impacts on the economic, social, and educational statuses of each country. It has changed the way people work, learn, and play, especially in developed countries where ICT infrastructure and human resources are available in plenty (Kozma, 2008, p.1083). The integration of ICT in education is a priority, and different countries have considered doing so because effective ICT use can enhance the quality and efficiency of education (Carmellaweb, 2016; Huawei and CSR Asia, 2016; MoEYS, 2004, 2018; UNESCO, 2010a). Furthermore, Teo (2008) claimed that teachers are the change agents in the successful integration of ICT into the classroom. Thus, whether teachers use ICT or not depends on their attitudes (Albinrini, 2006; Bindu, 2017; Mwila, 2018; Padmavathi, 2016; Teo, 2008;

Tezci, 2010).

Cambodia is a developing country that experienced a civil war from 1975 to 1979, when the Khmer Rouge was in power. The regime had destroyed all of Cambodia's infrastructure, including its education system which 80% of its teachers were assassinated (MoEYS, 2010; SEAMEO, 2010). Currently, the Royal Government of Cambodia (RGC) aims to make Cambodia a high middle-income country by 2030 and a developed country by 2050 (MoEYS, 2017; RGC, 2014). To achieve these goals, the RGC has been implementing the Rectangular Strategies focusing on the national development of knowledge and human resources through the enhancement of the quality of the education system to promote the development of science and technology (RGC, 2014). As effective educators can make great changes in their classrooms, the role of the educators in this context is extremely significant even in difficult situations. With this, Benveniste et al. (2008), MoEYS (2010), and Tandon and Fukao (2015) noted that the quality of pre-service teacher training in Cambodia was poor as the student-teachers lacked both pedagogical content knowledge (PCK) and subject knowledge. UNESCO (2010b) noted that the quality of teacher educators and the teacher education programs in Cambodia needed to be enhanced urgently.

UNESCO (2015) stated that educators need to have high quality teaching skills and engage in ICT use to ensure that teaching and learning processes are effective. As stated by the National Strategic Development Plan 2014-2018 of the Royal Government of Cambodia, strengthening the integration of ICT at all levels of education is necessary to enhance the quality of education (RGC, 2014, p.158). As consequent, the MoEYS has introduced various initiatives to facilitate the integration of ICT to improve the effectiveness of education at all levels (MoEYS, 2004). The first policy and strategy of ICT in education was developed in 2003, and this policy and strategy have enabled Cambodia to follow the global trend in facilitating access to education for all (MoEYS, 2004). Consistently, the MoEYS had also developed a wide range of strategies to apply ICT in teacher education, general education, and non-formal education to enhance quality at all levels (MoEYS, 2004). To promote effective ICT use, the MoEYS developed and introduced the Master Plan for Information and Communication Technology in Education 2009-2013. The MoEYS also developed and introduced a new policy and strategy of ICT in May 2018, which acknowledges ICT use as a significant means to promote the effectiveness and efficiency of teaching and learning with a greater focus on teacher education (MoEYS, 2018). Based on the Sustainable Development Goals (SDG) agenda, ICT must be harnessed to enhance the quality of education, expand research and knowledge creation, and ease information access and sharing, thus, this new policy and strategy for ICT aims to:

- (1) Adopt new management and administrative processes to modernize practices and increase the efficiency, transparency, and effectiveness of education sector governance and performance monitoring.
- (2) To integrate ICT as a teaching and learning, and knowledge sharing tool across the education sector to equip students with ICT knowledge and skills to transition to the 21<sup>st</sup> century world work (MoEYS, 2018, p.2).

It was also stated that by 2015 all teacher educators had attended a variety of training sessions on ICT skills and use, and all Teacher Education Colleges (TECs) have been equipped with ICT equipment (ADB, 2016; MoEYS, 2018). On the other continuum, the number of Internet users and mobile phone subscribers in Cambodia have increased rapidly. There were 33 Internet Service Providers (ISPs) and 9 mobile network operators in Cambodia, and 19,722,810 mobile phone subscribers (133% of the population) and 7,157,409 Internet users in 2016 (MPTC, 2016). With the high rate use of these technologies, it would provide more advantages to teachers and teacher educators to apply these technologies. Moreover, the Master Plan for Information and Communication Technology in Education 2009-2013 by MoEYS (2009) asserted that various forms of ICT include computer, LCD projector, printer, TV, radio, CD/DVD player, mobile phone, the Internet and other digital devices are increasing in each educational institution, especially in TECs which available to access and interact to make effective educational change. However, using ICT in Cambodia is still limited (MoEYS, 2015; Tandon & Fukao, 2015). Only a few teacher educators have integrated ICT in their teaching process (Benveniste et al., 2008; Dionys, 2012; Tandon & Fukao, 2015). Dionys (2012) claimed that the biggest concern for the implementation of ICT in Cambodia is teacher educators' attitudes. However, though there are some extant studies investigated on the use of ICT (e.g. Dionys, 2012; Seng et al., 2014; Tandon & Fukao, 2015), it is still unclear about the trends and patterns of Cambodian teacher educators' attitudes.

## 2. Purpose of the Study

To fill this gap, the purposes of this study are to investigate the trends of Cambodian basic education teacher educators' attitudes towards the use of ICT, and to find out the patterns of their attitudes across a few key demographic characteristics such as gender, age, computer experience, and ICT training. This study is guided by the following two research questions:

1. What are the trends of teacher educators' attitudes towards the use of ICT?
2. Is there any significant difference in teacher educators' attitudes towards the use of ICT across gender, age, computer experience, and ICT training?

### 3. Literature Review

The World Bank Group (2010, p.7) stated that ICT consists of “hardware, software, networks, and media for the collection, storage, processing, transmission and presentation of information (e.g., voice, data, text, and images), as well as related services”. The MoEYS of Cambodia defined ICT, in 2004, based on how it was used in Cambodia, and noted that it includes computer technology (hardware and software), computer networks, email, the Internet, radio, and TV (MoEYS, 2004). There are multiple kinds of ICT and the reasons for their use are diverse (Ng, 2015). With this, Ng (2015) defined ICT in the context of education as educational technologies such as (1) computers, tablets, and mobile phones or smartphones; (2) digital recording devices; (3) smart boards or interactive whiteboards; (4) data logging equipment and associated probes; (5) web 2.0 technologies and other online resources such as communication and collaborative resources, information and multimedia resources, and storage spaces; (6) educational software packages. Caluza et al. (2017) and Wei et al. (2016) argued that the integration of ICT is more focused on basic ICT use, such as on how to operate the computer and other ICT equipments. Furthermore, Razak et al. (2014) noted that modifying educators' traditional teaching methods to suit ICT is crucial because these computer-based technologies teaching aid are capable of changing both the modes of information distribution and interactive capability. Then the scope of ICT employed in this study is basic level of ICT use in which teacher educators use it as teaching support tool in order to enhance students' learning outcome. Based on Plomp et al. (2007), thus, ICT uses are divided into two different purposes—general ICT use and pedagogical ICT use. Moreover, researchers also aim to discover based on the context of Cambodia where ICT equipments are equipped to all TECs for basic use of ICT to enhance students' learning. Most of note, most of the teacher educators are reported to have attended various ICT training courses (ADB, 2016; Dionys, 2012; MoEYS, 2018, Tandon & Fukao, 2015) but they are not willing to use those ICT facilities and knowledge gained from those training. Therefore, the measurement of trends and patterns of the teacher educators' attitudes are important to enhance the use of ICT.

Studies conducted to investigate the use of ICT in different contexts revealed that the successful use of ICT significantly depends on teachers' attitudes (Albirini, 2006; Al-Zaidiyeen, 2010; Bindu, 2017; Gnanamuthu & Krishnakumar, 2009; Hue & Jalil, 2013; Mwila, 2018; Oladimeji et al., 2017; Semerci & Aydin, 2018; Teo, 2008; Tezci, 2010). Teachers' attitudes towards the use of ICT is one of the most important factors that contributes to achieve an effective use of ICT (Albirini, 2006; Al-Zaidiyeen, 2010; Bindu, 2017; Hue & Jalil, 2013; Mwila, 2018; Oladimeji et al., 2017; Semerci & Aydin, 2018). In addition, the attitudes are also considered as an indicator for effective change and the openness to new experience (Gnanamuthu & Krishnakumar, 2009; Hue & Jalil, 2013), and the controller of the actual behavior of teachers (Oladimeji et al., 2017). According to Fishbein and Ajzen (1975), attitude is defined as a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object. There are three components of attitude such as affective, cognitive, and behavioral (Breckler, 1984; Fishbein & Ajzen, 1975). Among them, thus components of attitude, and affective component refers to an emotional response or feelings of the person towards an evaluation of the person, object or situation which can be measured by gathering a verbal report of feeling or state of mind. Cognitive component includes the beliefs, knowledge structures, perceptual responses, and thoughts of a person about a certain object, person or situation. It reflects a person's beliefs or perceptions that measured by asking about thoughts or attitude scales. Behavioral component refers to clear activities, verbal statements respect behavior or intention to behave in an actual way towards something or someone which measured by asking about behavior or intentions or observing behavior (Breckler, 1984; Fishbein & Ajzen, 1975). These three components – affect, cognition, and behavior – are very helpful to determine the potential relationship between personal attitude and behavior as well as their complexity. With the object of personal attitude, they use it as a schema to determine object, issue or situation which possible to use self-report to measure attitudes of person towards that object, issue or situation as positive or negative, bad or good, or favored or not then set the ways to take towards it (Olson & Zanna, 1993). Moreover, Breckler (1984) argued that the theory of the Tripartite Model of Attitude Structure begun to play as an actual role to track personal attitude since 1960s. This theory also consists of components of attitude include affect (feeling), cognition (knowing), and behavior (acting) which used to measure personal attitudes towards the object, issue, or situation.

An individual holding a positive attitude towards something would be relied upon to play out any positive behavior and not to perform ominous behaviors, though the switch would be valid for an individual holding a negative attitude. With regard of teachers' attitudes towards the use of ICT, most of previous studies also used its components (affect, cognition, and behavior) as the measurement of attitude (Albirini, 2006; Al-Zaidiyeen, 2010; Bakr, 2011; Gnanamuthu & Krishnakumar, 2009; Oladimeji et al., 2017; Sánchez et al., 2012; Tezci, 2010) while few studies used only cognitive component as the measurement (Hue & Jalil, 2013; Semerci & Aydin, 2018). These studies conducted in different educational contexts to investigate various levels of educators. For instance, some studies conducted to investigate attitude of teachers in ASIAN context such as Albirini (2006) who investigated Syrian high school English as a Foreign Language (EFL) revealed that teachers had positive attitude. This was consistent with the findings of other studies such as the study by Hong and Koh (2002) who investigated Malaysian teachers' attitudes towards the use

of computer, Teo (2008) who investigated pre-service teachers' attitudes towards computer in Singapore, Hue and Jalil (2013) who investigated university lecturers in Vietnam, and Razak et al. (2014) who investigated attitudes of excellent Islamic education teachers in Selangor, Malaysia. Moreover, Al-Zaidiyeen (2010) employed survey method with 460 teachers in Jordan to investigate their attitudes and levels of ICT use in the classroom also found that the positive attitude among them which he argued that developing educators with a positive attitude will promote the usefulness of ICT. In addition, a number of studies conducted in other parts of the world also proved that teachers have positive attitude towards ICT (Tezci, 2010; Sánchez et al., 2012; Elsaadani, 2013; Teo et al., 2016; Bindu, 2017; Semerci & Aydin, 2018; Oladimeji et al., 2017; Mwila, 2018). Also, Bakr (2011) who investigated Egyptian teachers' attitudes revealed that enhancing the positive attitude might offer useful insights into the integration of ICT, the acceptances, and the use. Therefore, the previous studies argued that teachers' attitudes towards the use of ICT, whether positive or negative, effect how they respond to and use the technology (Oladimeji et al., 2017; Teo, 2008; Tezci, 2010) while teachers' positive attitude affect the extent of their ICT use (Al-Zaidiyeen, 2010; Mwila, 2018; Oladimeji et al., 2017). Teachers with a positive attitude towards ICT totally accepted the significance of the use in school and considered ICT as an important tool to make the better change in their classroom as well as school (Albirini, 2006; Oladimeji et al., 2017). Contextually, studies have investigated the use of ICT in Cambodia's education sector (e.g. Dionys, 2012; Seng et al., 2014; Tandon & Fukao, 2015). However, none of these studies have measured the attitude and its patterns. Thus, this study aims to fill this gap. Only a few studies have investigated teacher educators' attitudes towards the use of ICT in both developing and developed countries while its trends have not discussed clearly.

Some studies have investigated the differences in teachers' attitudes based on their demographic characteristics such as gender, age, computer experience, and the number of ICT training sessions that they have attended. The findings of these studies continue to be debated. They have argued that the understanding of gender-based differences and related attitudinal differences are important in understanding the application of ICT (Bakr, 2011; Liu, 2009; Tezci, 2010). Hong and Koh (2002) found that there was no significant difference. Bakr (2011) and Elsaadani (2013) also arrived at similar conclusions, indicating that there was no significant difference in Egyptian teachers' attitudes on gender. The findings were also consistent with Teo et al. (2016) and other studies (Albirini, 2006; Bindu, 2017; Cavas et al., 2009; Mwila, 2018; Oladimeji et al., 2017; Semerci & Aydin, 2018; Teo, 2008). However, Liu (2009) found that there were significant differences among teachers' attitudes and noted that females tended to favor ICT use more than males. Tezci (2010) also arrived at a similar conclusion but noted that males seemed more likely to have positive attitudes than females.

Semerci and Aydin (2018) found that there were no significant differences in teachers' attitudes based on their ages and arrived at findings that were consistent with those of Albirini (2006), Bindu (2017), Teo (2008), and Teo et al. (2016). These studies noted that both younger and older teachers had positive attitudes. On the other hand, Cavas et al. (2009) revealed that younger teachers favored ICT use more than old teachers. This result was confirmed by Mwila (2018), who argued that in the course of their education, younger teachers may be more open to using technologies and may gain more experience using ICT over time. Buabeng-Andoh (2012) found a positive significant correlation between teachers' ages and their attitudes. Elsaadani (2013) explored the relationship between Egyptian Higher Education Institution (HEI) lecturers' ages and their attitudes by surveying 412 teachers and found significant differences. He also made predictions based on age, which he concluded that age is an important factor in changing Egyptians HEI lecturers' attitudes.

Using computers more frequently made teachers more familiar with the impact of such use (Teo, 2008). Cavas et al. (2009) found that teachers who had experience using computers for five years or more tended to have positive attitudes as opposed to those who had lesser experience. This finding was consistent with those in Hong and Koh (2002), who noted that teachers who had experience using computers for three years or more tended to favor than those had lesser experience. These findings also overlap with those of Tezci (2010). Teo (2008) also found that there was a significant positive correlation among pre-service teachers in Singapore. Padmavathi (2016) and Buabeng-Andoh (2012) also arrived at similar conclusions. Padmavathi (2016) found that computer use experience significantly predicted attitudes towards computer use in general. However, Semerci and Aydin (2018) revealed that there were no significant difference in teachers' attitudes based on their experience using computers. Albirini (2006) found that computer use experience did not significantly predict teachers' attitudes.

Providing teachers with sufficient ICT training can enhance their beliefs and attitudes (Cavas et al., 2009; Christensen & Knezek, 2008; Sánchez et al., 2012, 2013; Semerci & Aydin, 2018; Tezci, 2010). Sánchez et al. (2013) and Oladimeji et al. (2017) suggested that a positive attitude requires effective training. Albirini (2006) found that ICT training had a significant correlation with the teachers' attitudes, however these attitudes were not significantly predicted by the extend of ICT training sessions that they attended. Tezci (2010) and Sánchez et al. (2013) found there was a significant difference in teachers' attitudes and based on the extent of ICT training that they had, although there was no significant difference in their attitudes towards Internet use. On the contrary, Semerci and Aydin (2018) found that there were no significant differences in teacher's attitudes based on the number of

training sessions they had attended.

## 4. Research Methods

### 4.1 Participants

A total sample of 135 teacher educators, 80 from Phnom Penh Teacher Education College (PTEC) and 55 from Battambang Teacher Education College (BTEC), were purposively selected to participate in the survey. One main reason for selecting only teacher educators because both TECs are the only two teacher training institutions that provide new basic education teacher training program (12 + 4 years) which implemented from 2018 (JICA, 2017; MoEYS, 2015a). Demographic characteristics of the teacher educators are presented in Table 1.

**Table 1.** Teacher educators' demographic characteristics (N=135)

	Variables	N	%
<i>Gender</i>	Male	76	56.30
	Female	59	43.70
<i>Age</i>	20 – 29	13	9.63
	30 – 39	82	60.74
	40 – 49	29	21.48
	50 and older	11	8.15
<i>Computer Experience</i>	Least than 3	35	25.93
	3 – 5	26	19.26
	6 – 8	29	21.48
	9 – 11	22	16.30
	12 – 14	12	8.89
	15 and longer	11	8.15
<i>ICT Training</i>	Never	21	15.56
	1 – 3	104	77.04
	4 – 6	6	4.44
	7 and more	4	2.96

### 4.2 Instrument and Measures

Regarding the data collection, the researchers used a self-reported questionnaire. The questionnaire was developed in English and translated into the Khmer. Both English and Khmer language versions were sent to specific subject teacher educators in Cambodia to check. We received their feedback and in the instrument development phase, we checked instrument validity. The researchers also conducted a pilot survey to check instrument reliability and received additional feedback.

The instrument in this study consisted of two parts. The first part is demographic characteristics of the teacher educators such as gender (1 = male, 2 = female), age (1 = 20 – 29, 2 = 30 – 39, 3 = 40 – 49, 5 = 50 and older), computer experience (1 = least than 3, 2 = 3 – 5, 3 = 6 – 8, 4 = 9 – 11, 5 = 12 – 14, 6 = 15 and above), and ICT training (1 = Never, 2 = 1 – 3, 3 = 4 – 6, 4 = 7 and more). The second part consists of 25 items adapted from Albirini (2006) (used by Al-Zaidiyeen et al., 2010; Bindu, 2017; Liu, 2009) and Oladimeji et al. (2017) and was used to measure the teacher educators' attitudes. Items 1 to 7 were used to measure the teacher educators' feelings and emotions about incorporating ICT in education (effective), items 8 to 17 were used to measure the teacher educators' beliefs around and knowledge of ICT in education (cognitive), and items 18 to 25 were used to measure the actions and intentions (behavioral). Teacher educators' attitudes were measured on a 5-point Likert scale (Strongly Disagree = 1, Disagree = 2, Neutral = 3, Agree = 4, and Strongly Agree = 5). Some items were framed in the form of negative statements in order to control respondents' answers and to check if they answered with enough concentration.

To ensure instrument validity, exploratory factor analysis with Principle Axis Factoring for factor extraction method and Direct Oblimin for factor rotation method was employed. Applying the cut-off factor loadings of .40 and each item should not be loaded into more than one factor (Field, 2005), 13 items were removed. There were a few justifications for this removal. First, 5 items (items 1, 8, 9, 13, and 22) were removed because they did not load into any factor as their factor loadings were lower than the cut-off score of .40. Second, 8 items (items 3, 4, 10, 11, 16, 18, 20, and 25) loaded into more than one factor. With KMO value

of .88, the remaining 12 items loaded into three factors each of which consisted of 4 items. Factor 1 was named as Affective (items 2, 5, 6, and 7), factor 2 as Cognitive (items 12, 14, 15, and 17), and factor 3 as Behavioral (items 19, 21, 23, and 24). The overall Cronbach's alpha value of the measurement was  $\alpha = .84$ .

### 4.3 Data Analysis

The collected data were processed by using SPSS version 23 and through the process of data entry, the scoring of all negative statements was reversed. Moreover, the researchers also conducted exploratory factor analysis to test instrument validity for teacher educators' attitudes. To answer to the first research question, the descriptive statistics were used to describe and summarize the collected data included frequency, means, and standard deviations of the scores of items. To answer second research question, independent samples t-test and one-way ANOVA were used.

## 5. Findings

### 5.1 Trends of Teacher Educators' Attitudes

Figure 1 indicates the results of research question 1. Throughout the findings, Cambodian basic education teacher educators expressed positive attitudes ( $M = 4.13$ ,  $SD = .45$ ). According to Figure 1, among three components of teacher educators' attitudes, the mean score of both affective and cognitive components were not so far difference which affective component ( $M = 3.96$ ,  $SD = .67$ ) and cognitive component ( $M = 3.99$ ,  $SD = .54$ ) while the highest was behavioral component ( $M = 4.44$ ,  $SD = .49$ ). Hence, it proved that teacher educators have high intention compare with their feeling and belief. For affective component, the highest mean score was the statement which indicated that the use of ICT is enjoyable ( $M = 4.15$ ,  $SD = .80$ ) and the lowest mean score, they like using LCD projector and computers in teaching ( $M = 3.97$ ,  $SD = .10$ ). For cognitive component, most of them believed that the integration of ICT in the classroom encourages the improvement of the teaching-learning process ( $M = 4.29$ ,  $SD = .60$ ) and computers, smartphones, LCD projectors, and the Internet connection are necessary for their classroom ( $M = 4.10$ ,  $SD = .73$ ). In contrast, the lowest mean score, they believed that ICT helps them to discuss teaching ideas with others effectively ( $M = 4.01$ ,  $SD = .68$ ). On the other hand, most of them intended to learn more about computers ( $M = 4.52$ ,  $SD = .58$ ) and also willing to receive training in the use of ICT to integrate into teaching-learning process to improve their teaching quality ( $M = 4.45$ ,  $SD = .56$ ) while the lowest mean score, they will use ICT in teaching if there are relevant equipment available at school ( $M = 4.35$ ,  $SD = .59$ ).

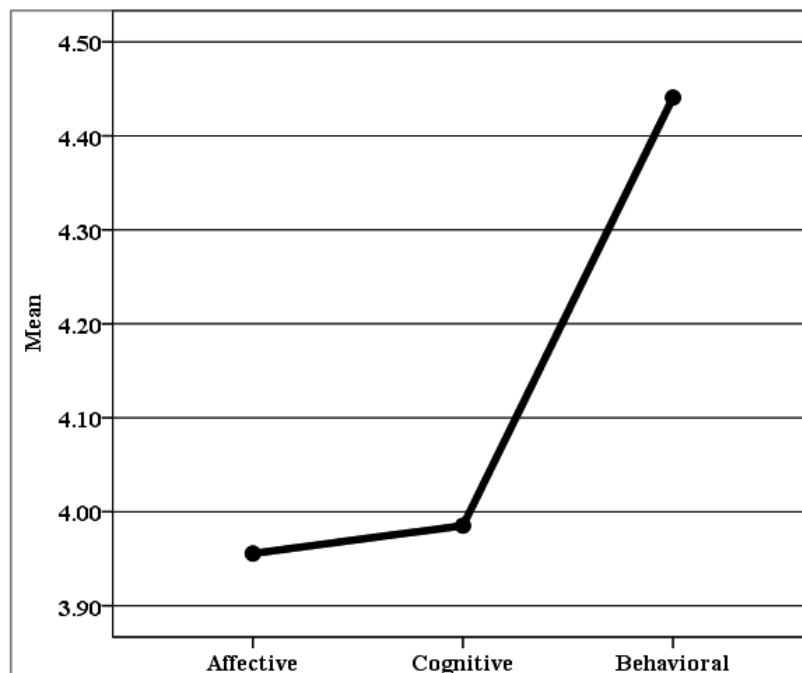


Figure 1. Mean of each component of attitudes

## 5.2 Patterns of Teacher Educators' Attitudes

### 5.2.1 Gender

Table 2 illustrates the patterns of teacher educators' attitudes by gender divide. Males reported more favorable attitudes than females did. With this, there was a significant difference in teacher educators' emotion or feeling (affective component),  $t(133) = 2.41, p < .05$ . Males seemed to be more likely ( $M = 4.08, SD = .45$ ) than females ( $M = 3.80, SD = .42$ ). Also, males expressed significantly differ in their intention (behavioral component),  $t(133) = 2.37, p < .05$ . Males reported higher intention ( $M = 4.53, SD = .45$ ) than females as well ( $M = 4.33, SD = .51$ ). However, there was no significantly different in teacher educators' belief (cognitive component),  $t(133) = .61, p > .05$ . Male and female teacher educators seemed to have the same belief, males ( $M = 4.01, SD = .57$ ) and females ( $M = 3.95, SD = .48$ ).

**Table 2.** Teacher educators' attitudes by gender divide

Components of Attitude	Gender	M	SD	t	Sig.
Affective	Male	4.08	.45	2.41	.017*
	Female	3.80	.42		
Cognitive	Male	4.01	.57	.61	.55
	Female	3.95	.48		
Behavioral	Male	4.53	.45	2.37	.019*
	Female	4.33	.51		

Note: \*  $p < .05$

### 5.2.2 Age

Table 3 indicates the patterns of teacher educators' attitudes across different age group. They were ranged into four categories of age such as between 20 and 29 years, 30 and 39 years, 40 and 49 years, 50 years and older. There is no significant difference in all the three components of attitudes (affective, cognitive, and behavioral components) based on their age. The findings revealed that teacher educators in any age group reported the same favorable attitude.

**Table 3.** Teacher educators' attitudes across different age group

Components of Attitude	Age	M	SD	F	Sig.
Affective	20 – 29	4.21	.52	1.92	.130
	30 – 39	3.98	.70		
	40 – 49	3.73	.66		
	50 and older	4.09	.53		
Cognitive	20 – 29	4.13	.46	.44	.73
	30 – 39	3.98	.55		
	40 – 49	3.94	.53		
	50 and older	3.93	.53		
Behavioral	20 – 29	4.46	.58	1.77	.156
	30 – 39	4.49	.45		
	40 – 49	4.41	.43		
	50 and older	4.44	.49		

### 5.2.3 Computer Experience

Teacher educators who had more experience using computer seemed to have more favorable attitudes compared to those who had less experience. To get insight into the significant difference in their attitudes based on their computer experience, the results in Table 4 indicated more detail. For affective components, teacher educators who had experience least than 3 years reported the weakest feeling ( $M = 3.65, SD = .53$ ) and stronger between 3 and 5 years ( $M = 3.74, SD = .58$ ), 6 and 8 years ( $M = 4.06, SD = .73$ ), 9 and 11 years ( $M = 4.12, SD = .56$ ), 12 and 14 years ( $M = 4.31, SD = .71$ ), while the strongest attitude was those for 15 years and longer ( $M = 4.43, SD = .73$ ). The significant difference was found in the affective component of computer use experience at  $p < .05$  level [ $F(5, 129) = 4.82, p < .001$ ]. Similarly, the significant difference was found in cognitive components regarding their computer experience at  $p < .05$  level [ $F(5, 129) = 4.57, p < .01$ ]. Between 3 and 5 years reported the lowest belief ( $M = 3.76, SD = .57$ ), and

higher were less than 3 years ( $M = 3.81, SD = .52$ ), between 9 and 11 years ( $M = 4.02, SD = .41$ ), 6 and 8 years ( $M = 4.09, SD = .48$ ), and 12 and 14 years ( $M = 4.27, SD = .51$ ), while the strongest belief was 15 years and longer ( $M = 4.41, SD = .49$ ). The significant difference was also found in behavioral components at  $p < .05$  level [ $F(5, 129) = 4.00, p < .01$ ]. Teacher educators between 3 and 5 years reported the lowest intention ( $M = 4.24, SD = .53$ ), and higher were less than 3 years ( $M = 4.28, SD = .48$ ), then 9 and 11 years ( $M = 4.51, SD = .46$ ), 6 and 8 years ( $M = 4.53, SD = .42$ ), while the highest was 12 and 14 years ( $M = 4.73, SD = .41$ ) and 15 years and longer ( $M = 4.73, SD = .34$ ).

**Table 4.** Teacher educators' attitudes by computer experience divide

Components of Attitude	Computer Experience	<i>M</i>	<i>SD</i>	<i>F</i>	<i>Sig.</i>
Affective	Less than 3	3.65	.53	4.82	<b>.000***</b>
	3 – 5	3.74	.58		
	6 – 8	4.06	.73		
	9 – 11	4.12	.56		
	12 – 14	4.31	.71		
	15 and longer	4.43	.73		
Cognitive	Less than 3	3.81	.52	4.57	<b>.001**</b>
	3 – 5	3.76	.57		
	6 – 8	4.09	.48		
	9 – 11	4.02	.41		
	12 – 14	4.27	.51		
	15 and longer	4.41	.49		
Behavioral	Less than 3	4.28	.48	4.00	<b>.002**</b>
	3 – 5	4.24	.53		
	6 – 8	4.53	.42		
	9 – 11	4.51	.46		
	12 – 14	4.73	.41		
	15 and longer	4.73	.34		

**Note:** \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Table 5 shows the results of the Post Hoc multiple comparison test or Tukey HSD test (test of homogeneity of variances  $p > .05$ ) of the differences in the impact of experience using computers on components of attitudes. As indicated for affective component, teacher educators with experience using computers for a period of under 3 years differed significantly in their emotion from between 12 and 14 years ( $p < .05$ ), and 15 years and longer ( $p < .01$ ). This significant difference also found among 3 to 5 years and around 15 years and longer ( $p < .05$ ). For cognitive component, under 3 years differed significantly in their belief from 15 years and longer ( $p < .01$ ), while between 3 and 5 years also found significant difference from between 12 and 14 years ( $p < .05$ ), and 15 and longer ( $p < .01$ ). In addition, under 3 years differed significantly in their intention from between 12 and 14 years ( $p < .05$ ), while between 3 and 5 years differed significantly in their emotion from between 12 and 14 years ( $p < .05$ ), and 15 and longer ( $p < .05$ ). Thus, teacher educators' computer experience can affect their attitudes. Although, 12 to 14 years and 15 years or longer reported the most favorable attitudes.

#### 5.2.4 ICT Training

Table 6 illustrates the patterns of teacher educators' attitudes regarding the number of attended ICT training sessions. The number of attended ICT training sessions seemed to have effect on teacher educators' attitudes. Between 4 and 6 sessions reported the strongest feeling ( $M = 4.46, SD = .77$ ) and weaker for 7 sessions and more ( $M = 4.31, SD = .94$ ), then between 1 and 3 sessions ( $M = 3.98, SD = .66$ ), and the weakest was not attended any ICT training ( $M = 3.63, SD = .53$ ). The significant difference was found in their feeling based on the number of attended ICT training at  $p < .05$  level [ $F(3, 131) = 3.37, p < .05$ ]. Also, the number of attended ICT training sessions was significantly different in teacher educators' belief in the use of ICT in education at  $p < .05$  level [ $F(3, 131) = 2.81, p < .05$ ]. Teacher educators between 4 and 6 sessions reported the strongest feeling ( $M = 4.29, SD = .43$ ) and weaker for 7 sessions and more ( $M = 4.25, SD = .54$ ), then between 1 and 3 sessions ( $M = 4.01, SD = .54$ ), and the weakest not attended any ICT training ( $M = 3.73, SD = .45$ ). However, the difference was marginally significant in teacher educators' intention regarding the number of attended ICT training at  $p < .05$  level [ $F(3, 131) = 2.66, p = .051$ ].



**Table 5.** The results of the Post Hoc Tukey HSD test showing the differences in the impact of experience using computers on components of attitudes

Components of Attitude	(I) Com. Experience	(J) Com. Experience	Mean Difference (I-J)	Sig.
Affective	Less than 3	3 – 5	-.09	.993
		6 – 8	-.41	.102
		9 – 11	-.48	.066
		12 – 14	-.66*	.023
		15 and above	-.78*	.006
	3 – 5	Less than 3	.00	.993
		6 – 8	-.32	.411
		9 – 11	-.31	.283
		12 – 14	-.52	.100
		15 and above	-.61*	.031
Cognitive	Less than 3	3 – 5	.05	.999
		6 – 8	-.29	.210
		9 – 11	-.22	.615
		12 – 14	-.46	.071
		15 and above	-.60*	.009
	3 – 5	3 – 5	-.05	.999
		6 – 8	-.34	.141
		9 – 11	-.26	.464
		12 – 14	-.51*	.047
		15 and above	-.65*	.006
Behavioral	Less than 3	3 – 5	.04	1.000
		6 – 8	-.26	.238
		9 – 11	-.23	.431
		12 – 14	-.45*	.045
		15 and above	-.45	.060
	3 – 5	3 – 5	.04	1.000
		6 – 8	-.29	.176
		9 – 11	-.27	.329
		12 – 14	-.49*	.033
		15 and above	-.49*	.044

Note: \*  $p < .05$

**Table 6.** Teacher Educators' Attitudes by ICT Training Divide

Components of Attitude	ICT Training	M	SD	F	Sig.
Affective	Never	3.63	.53	3.37	<b>.021*</b>
	1 – 3	3.98	.66		
	4 – 6	4.46	.77		
	7 and more	4.31	.94		
Cognitive	Never	3.73	.45	2.81	<b>.042*</b>
	1 – 3	4.01	.54		
	4 – 6	4.29	.43		
	7 and more	4.25	.54		
Behavioral	Never	4.21	.48	2.66	.051
	1 – 3	4.46	.48		
	4 – 6	4.67	.34		
	7 and more	4.75	.50		

Note: \*  $p < .05$

Table 7 presents the results of the Post Hoc multiple comparison test or the Tukey HSD test of differences in components of attitudes based on the number of attended ICT training sessions. It indicates that teacher educators who have not attended any training session and attended 4 to 6 sessions differed significantly in their emotion ( $p < .05$ ). This finding shows that the number of ICT training contributes to teacher educators' attitudes. The group of teacher educators who attended 4 to 6 ICT training reported having the most favorable attitudes. However, their belief differed significantly based on the number of attended, but there was not any significant difference was found among each number of attended ICT training session.

**Table 7.** The results of the Post Hoc Tukey HSD test showing differences in components of attitudes based on the number of ICT training sessions attended

Component of Attitude	(I) ICT Training	(J) ICT Training	Mean Difference (I-J)	Sig.
Affective	Never	1 – 3	-.35	.121
		4 – 6	-.83*	.035
		7 and more	-.68	.226
	1-3	Never	.35	.121
		4 – 6	-.48	.301
		7 and more	-.33	.746

Note: \*  $p < .05$

## 6. Discussions

Teacher educators' attitudes towards the use of ICT in education have important effects on their ICT use (Tezci, 2010). Based on the findings of this study, teacher educators expressed positive attitudes wherein 82.22% of the respondents reported that they strongly agreed and agreed with the statements used to measure their attitudes, and 13.70% reported neutral responses, while only 3.70% reported that they disagreed and strongly disagreed. Based on the rapid development of ICT in this 21<sup>st</sup> century, the important use of ICT for effective change in education have been aware worldwide. More specifically, the positive attitudes of teacher educators may evidence from various initiatives to facilitate the integration of ICT to improve the effectiveness of education at all levels that provided by the MoEYS. Some upper secondary schools and especially teacher education institutions were equipped ICT equipment sufficiently according to the standard which set by the MoEYS, and teacher educators have attended ICT training sessions both short and long-terms that prepared by the MoEYS gradually after the first policy and strategy of ICT in education was developed and introduced in 2003 (ADB, 2016; MoEYS, 2009, 2015b, 2018). There were several projects that implemented in order to enhance ICT use in education in Cambodia. One project titled "Establishing Effective Use of ICT in Education for All in Cambodia" with collaboration between UNESCO, MoEYS, and Japanese Funds-in-Trust developed the national policy on ICT in education, provided ICT training to teacher educators and teachers, and provided computers to some schools, especially TECs (Richardson, 2009; UNESCO Bangkok, 2003). Moreover, project titled "Open School Programme (OSP)" have introduced some educational software (SEAMEO, 2010; UNESCO, 2013). Also, another project titled "Enhancing Education Quality Project" which funded by ADB, teacher educators had undergone ICT training and some ICT equipments were provided to each teacher education institution (ADB, 2016). In addition, the illustrated positive attitudes in which affective ( $M = 3.96$ ,  $SD = .67$ ) and cognitive ( $M = 3.99$ ,  $SD = .54$ ) while behavioral component ( $M = 4.44$ ,  $SD = .49$ ). The trends of teacher educators' attitudes, thus, it can be inferred that teacher educators have low mean scores in the affective component when compared to the cognitive component, while the highest mean scores were acquired by their behavioral component and this finding was consistent with Bakr (2011). Therefore, the finding of positive attitude was consistent with Albirini (2006), Mwila (2018), Semerci and Aydin (2018), and Tezci (2010). Albirini (2006) and Padmavathi (2016) claimed that having positive attitudes implied that teachers accepted the important of ICT integration for the implementation of effective change in their classrooms and expected to use ICT as and when it was made available to them. In this study, teacher educators had very high intentions to learn more about computer use and to receive training on ICT use to integrate it into the teaching and learning process.

Regarding gender contribution, 135 respondents were males, accounting for 56.30%, while 43.70% were females. The findings revealed that teacher educators' attitudes differed significantly by gender, wherein males reported favoring more than females. This finding overlapped with those of Tezci (2010). Liu (2009) also found significant differences between teachers' attitudes towards the use of ICT based on gender, although their findings reported the converse. The results of our study are inconsistent with those of Bindu (2017), Cavas et al. (2009), Elsaadini (2013), Oladimeji et al. (2017), and Teo et al. (2016), all of whom found that both male and female teachers had the same degree of favorable attitudes. Among all the three components of

attitudes, males and females expressed significant difference in their feeling about and intention, while their belief did not. Males reported stronger feeling than females. Moreover, males also reported higher intention than females. As both males and females exhibited the same belief, it may be the piece of results which influenced from intervention that provided by MoEYS as well as the global trend of ICT use because based on ADB (2016), MoEYS (2009), Tandon and Fukao (2015), and UNESCO (2013), various ICT training courses have been prepared for teacher educators and also all TECs are equipped with ICT equipments. However, females seemed to have weaker feeling about and intention when compared to males. This might be due to the fact that female might not have as strong background in and attitudes towards technology related matters as male. As it was found in a study by Kao (2013) who revealed that Cambodian females were not likely to choose science and engineering majors when compared to males. The study found that males performed better when compared to females. Also, it might reflect the cultural reality in the context of Cambodia in which females are more oriented to business related rather than technology related careers.

The respondents' ages ranged from 20 years to 50 years and above. Approximately 60.74% were aged between 30 and 39 years, 21.48% between 40 and 49 years, and 9.63% between 20 and 29 years. Only 8.15% of them were aged above 50 years. Based on the findings, there were no significant difference among all the three components of teacher educators' attitudes based on age, indicating that teacher educators of all ages had the same favorable attitudes. This finding concurred with the findings of Albirini (2006), Teo (2008), and Teo et al. (2016), while they were inconsistent with the findings of Buabeng-Andoh (2012), Cavas et al. (2009), and Mwila (2018), who found that younger teachers tended to favor when compared to older teachers, while Elsaadini (2013) found the converse to be true.

According to Albirini (2006), Plomp et al. (2007), and Cavas et al. (2009), teacher educators should be aided in acquiring more experience before they are made to use ICT in their teaching process, so that they can familiarize themselves with it. The findings of this study revealed that teacher educators' attitudes seemed to have significant differences based on their computer experience. The trends of attitudes indicated that teacher educators' computer experience differed significantly in the three components of their attitudes. Those who had experience using computers ranging 6 to 8 years and 9 to 11 years had slightly difference favorable attitudes, followed by under 3 years and 3 and 5 years. From 12 to 14 years and 15 years and more had the most favorable attitudes. This finding is consistent with Cavas et al. (2009), who claimed that computer use experience is the most important factor that affects teachers' attitudes. The finding also found resonance with those of Hong and Koh (2002), Teo (2008), and Padmavathi (2016), who indicated that teachers who had longer computer use experience tended to favor ICT use. In contrast, the finding is inconsistent with Semerci and Aydin (2018) who claimed that teachers who did not have any experience and those who had less experience had the same degree of favorable attitudes.

A number of studies have indicated that providing sufficient ICT training to teachers is very important, and needs to be considered because it can enhance teachers' attitudes in their teaching and learning process (Christensen & Knezek, 2008; Sánchez et al., 2013; Semerci & Aydin, 2018). Teacher educators were likely to present significant differences in their attitudes based on the number of attended ICT training sessions. This finding was consistent with the findings of Albirini (2006) and Tezci (2010), who also noted that teachers' attitudes towards the use of ICT varied based on the number of ICT training sessions they attended. The findings in this study are inconsistent with Semerci and Aydin (2018). Specifically, this study found that there were significant differences in the teacher educators' feeling about and belief based on the extent of training they had received, while they difference was marginally significant in their intention based on the number of attended ICT training sessions. With this regard, those who had not attended any ICT training reported weaker feeling than those had attended 1 to 3 training sessions. Those who had attended 4 to 6 ICT training sessions reported having the strongest feeling, followed by 7 or more ICT training sessions. Furthermore, it was the same for teacher educators' belief. Approximately 77% of the respondents reported having attended 1 to 3 ICT training sessions, which indicated that the provision of ICT training is still limited. MoEYS (2009), Tandon and Fukao (2015), and UNESCO (2013) indicated that most teacher educators in Cambodia have been taught to use hardware such as computers, storage devices, printers, scanners, digital cameras, and digital recorders as well as some educational software such as Microsoft Office, Open Office, graphic design software, basic computer maintenance, email, and the Internet to integrate into their teaching process. These ICT training courses were provided through different projects. With this, one project titled "Establishing Effective Use of ICT in Education for All in Cambodia", from May to August 2003, 526 teacher educators acquired various levels of training on the use of ICT in teaching and learning process which the training included the use of hardware such as computers, scanners, printers, digital recorders, and cameras as well as software such as Microsoft Office, email, and the Internet (MoEYS, 2004; Richardson, 2009; UNESCO Bangkok, 2003). Moreover, in May 2007 through one project titled "Open School Programme (OSP)", some teacher educators and high school teachers were trained to use educational software such as word processing, spreadsheets, Internet, email, etc. which used in Khmer language (SEAMEO, 2010, p.56, UNESCO, 2013, p.26). Regarding ICT training, the study by Sánchez et al. (2012) found that ICT training did not significantly contribute to teachers' attitudes. However, a year later, they revised their ICT training model, wherein in addition to traditional training, they enhanced in-practice monitoring processes

through the use of guided practice and peer collaborations that were found suitable to their current situations and showed that effective ICT training contributed to teachers' attitudes (Sánchez et al., 2013).

## 7. Conclusion and Implications

ICT is a major tool to support teaching and learning processes towards the demands of the 21<sup>st</sup> century skills. In addition, digital education is the future education. The purposes of the study aim to investigate trends and patterns of Cambodian basic education teacher educators' attitudes towards the use of ICT in education. Based on the findings, most of basic education teacher educators of both PTEC and BTEC perceived that the use of ICT in teaching and learning process is very important to enhance the quality of their teaching and learning process. Interestingly, teacher educators seemed to have positive attitudes. Moreover, they perceived lower emotions (affect) compare to their belief (cognition) while the highest was their intention (behavior). Throughout the finding, teacher educators have very high intention to learn more about the computer as well as to attend training courses so that they are able to integrate into the teaching and learning process. Regarding the patterns of teacher educators' attitudes, the finding revealed that teacher educators' emotions differed significantly regarding their gender, computer experience, and the number of attended ICT training sessions, while their belief had significant difference based on computer experience and the number of attended ICT training sessions. Teacher educators' intention differed significantly based on gender and computer experience, while its difference was marginally significant according to the number of attended ICT training sessions.

As attitudes indicate the extent of ICT use, the finding of the study provides some implications for the enhancement of teacher educators' attitudes. First should be taken note that the enhancement of teachers' attitudes should be considered from the gender perspective in which females should be more taken care of. In addition, addressing the attitudes from gender perspective, more computer experiences as well as provide sufficiently ICT trainings should be in place. It is clear that provision of ICT trainings could be at least between 4 and 6 sessions to reach the highest favorable attitudes. However, according to the study conducted by Sánchez et al. (2013), the progress of ICT training should be modified in order to clarify if it is provided effectively.

## References

- ADB. (2016), *Cambodia: Enhancing Education Quality Project*, Phnom Penh, Kingdom of Cambodia, Asian Development Bank.
- Albirini, A. A. (2006), Teacher's attitudes toward information and communication technologies: The case of Syrian EFL teachers, *Journal of Computers and Education*, 47, 373-398.
- Al-Zaidiyeen, J. N., et al. (2010), Teachers' Attitudes and Levels of Technology Use in Classroom: The Case of Jordan Schools, *International Education Studies*, 3 (2), 211-218.
- Bakr, S. M. (2011), Attitudes of Egyptian Teachers towards Computers, *Contemporary Education Technology*, 2 (4), 308-318.
- Benveniste, L., et al. (2008), *Teaching in Cambodia*, Phnom Penh, Kingdom of Cambodia, World Bank.
- Bindu, C. N. (2017), Attitude Towards, and Awareness of Using ICT in Classroom: a Case of Expatriate Indian Teachers in UAE, *Journal of Education and Practice*, 8 (1), 10-17.
- Breckler, S. J. (1984), Empirical validation of affect, behavior, and cognition as distinct components of attitude, *Journal of Personality and Social Psychology*, 47 (6), 1191-1205.
- Buabeng-Andoh, C. (2012), An exploration of teachers' skills, perception and practices of ICT in teaching and learning in the Ghanaian second-cycle schools, *Contemporary educational technology*, 3 (1), 36-49.
- Caluza, L. J. B., et al. (2017), An Assessment of ICT Competencies of Public School Teachers: Basis for Community Extension Program. *IOSR Journal of Humanities and Social Science*, 22 (03), 01-13.
- Carmellaweb. (2016), *What Is IT and Why Is IT Important?*, Retrieved November 5, 2018, from [http://www.mpict.org/ict\\_education\\_defined\\_importance.html](http://www.mpict.org/ict_education_defined_importance.html)
- Cavas, B., et al. (2009), A study on science teachers' attitudes toward information and communication technologies in education, *The Turkish online journal of educational technology*, 8 (2).
- Christensen, R. and Knezek, G. (2008), Self-report measures and findings for information technology attitudes and competencies, J. Voogt, and G. Knezek eds., *International Handbook of Information Technology in Primary Education*, Springer Science + Business Media, 349-365.
- Dionys, D. (2012), Introduction of ICT and multimedia into Cambodia's teacher training centres, *Australasian Journal of Educational Technology*, 28 (6), 1068-1073.
- Fishbein, M., and Ajzen, I. (1975), *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*, Reading, MA, Addison-Wesley Publishing Company, Inc.,

- Gnanamuthu, J. S., and Krishnakumar, R. (2009), A Tool to Measure the B.ED Teacher Trainers' Attitude towards ICT, *i-manager's Journal on School Educational Technology*, 5 (2), 39-42.
- Hong, K.S. and Koh, C. K. (2002), Computer Anxiety and Attitudes towards computers among Rural Secondary School Teachers: A Malaysian Perspective, *Journal of Research on Technology in Education*, 35 (1), 27-48.
- Huawei. and CSR Asia. (2016), *The role of ICT in realising education for all by 2030: Achieving Sustainable Development Goal 4*, Retrieved June 21, 2019, from <http://www.csr-asia.com/download/ICT4SDG4-Final-Version.pdf>.
- Hue, L. T., and Jalil, H. A. (2013), Attitudes towards ICT Integration into Curriculum and Usage among University Lecturers in Vietnam, *International Journal of Instruction*, 6 (2).
- JICA. (2017), *Preparatory Survey Report for the Project for the Construction of Teacher Education Colleges in the Kingdom of Cambodia*, Phnom Penh, Kingdom of Cambodia, Japan International Cooperation Agency (JICA).
- Kao, S. (2013), *Factors Affecting Students' Choice of Science and Engineering Majors in Higher Education of Cambodia* (Unpublished master's thesis), Hiroshima University, Hiroshima Prefecture, Japan.
- Kozma, B. R. (2008), Comparative analysis of policies for ICT in education, J. Voogt and G. Knezek eds., *International Handbook of Information Technology in Primary and Secondary Education*, CA, USA, Springer Science + Business Media, 1083-1096.
- Liu, J. (2009), A Survey of EFL Learners' Attitudes toward Information and Communication Technologies, *English Language Teaching*, 2 (4), 101-106.
- MoEYS. (2004), *Policy and Strategies on Information and Communication Technology in Education in Cambodia*, Phnom Penh, Kingdom of Cambodia, Ministry of Education, Youth, and Sport.
- MoEYS. (2009), *Master Plan for Information and Communication Technology in Education 2009-2013*, Phnom Penh, Kingdom of Cambodia, Ministry of Education, Youth, and Sport.
- MoEYS. (2010), *Teacher Development Master Plan 2010-2014*, Phnom Penh, Kingdom of Cambodia, Ministry of Education, Youth, and Sport.
- MoEYS. (2015a), *Teacher Policy Action Plan*, Phnom Penh, Kingdom of Cambodia, Teacher Training Department of Ministry of Education, Youth and Sport.
- MoEYS. (2015b), *Enhancing Education Quality Project (EEQP)*, Phnom Penh, Kingdom of Cambodia, Ministry of Education, Youth and Sport.
- MoEYS. (2017), *Framework Bachelor for Arts (Education) Teacher Education College (TEC)*, Phnom Penh, Kingdom of Cambodia, Teacher Training Department of Ministry of Education, Youth and Sport.
- MoEYS. (2018), *Policy and Strategy on Information and Communication Technology in Education*, Phnom Penh, Kingdom of Cambodia, Ministry of Education, Youth and Sport.
- MPTC. (2016), *Telecommunications*, Phnom Penh, Kingdom of Cambodia, Ministry of Posts and Telecommunications.
- Mwila, P. (2018), Assessing the attitudes of secondary school teachers towards the integration of ICT in the teaching process in Kilimanjoro, Tanzania, *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 14 (3), 223-238.
- Ng, W. (2015), *New Digital Technology in Education: Conceptualizing Professional Learning for Educators*, Switzerland, Springer.
- Oladimeji, O. F., et al. (2017), Colleges of Education Lecturers Attitude towards the Use of Information and Communication Technology in Nigeria, *Malaysian Online Journal of Educational Sciences*, 5 (4), 1-12.
- Olson, J. M., and Zanna M. P., (1993), Attitudes and attitude change, *Annu. Rev. Psychol*, 44, 117-154.
- Padmavathi, M. (2016), A study of student-teachers' readiness to use computers in teaching: an empirical study, *i-manager's journal on school educational technology*, 11 (3), 29-39.
- Plomp, T., et al. (2007), SITES2006-International Comparative Survey of Pedagogical Practices and ICT in Education, *Educ Info Technol*, 12, 83-92.
- Razak, K. A., et al. (2014), Information and Communication Technology among Excellent Islamic Education Teachers in Selangor Malaysia, *International Education Studies*, 7 (13), 146-156.
- Richardson, J. W., (2009), Providing ICT Skills to Teacher Trainers in Cambodia: Summary of Project Outputs and Achievements, *Journal of Education for International Development*, 4 (2), 1-11.
- Sánchez, A. B., et al. (2012), In-service teachers' attitudes towards the use of ICT in classroom, *Procedia-Social and Behavioral Sciences*, 46, 1358-1364.
- Sánchez, A. B., et al. (2013), Teacher Development and ICT: The Effectiveness of a Training Program for In-Service School Teachers, *Procedia-Social and Behavioral Sciences*, 92, 529-534.
- SEAMEO. (2010), *Report: Status of ICT Integration in Education in Southeast Asian Countries*, Bangkok, Thailand, The Southeast Asian Ministers of Education Organization (SEAMEO) Secretariat.

- Semerci, A., and Aydin, M. K. (2018), Examining upper secondary school teachers' attitudes towards ICT in education, *International journal of progressive education*, 14 (2), 93-105.
- Seng, S., et al. (2014), The role of teacher in enhancing ICT-integrated education in Cambodia, *International Studies Review*, 15 (2), 71-92.
- Tandon, P., and Fukao, T. (2015), *Educating the Next Generation Improving Teacher Quality in Cambodia*, Washington DC, World Bank Group.
- Teo, T. (2008), Pre-service teachers' attitudes towards computer use: A Singapore survey, *Australasian journal of education technology*, 24 (4), 413-424.
- Teo, T., et al. (2016), Modelling Serbian pre-service teachers' attitudes towards computer use: A SEM and MIMIC approach, *Computer & education*, 96, 77-88.
- Tezci, E. (2010), Attitudes and knowledge level of teachers in ICT use: The Case of Turkish Teachers, *International Journal of Human Sciences*, 7 (2), 19-44.
- The Royal Government of Cambodia (RGC). (2014), *National Strategic Development Plan 2014-2018*, Phnom Penh, Kingdom of Cambodia.
- UNESCO Bangkok. (2003), Cambodia ICT use in education, G. Farrell, and C. Wachholz eds., *Asia-Pacific Regional Bureau of Education: Meta-Survey on the Use of Technologies in Education*, Bangkok, UNESCO Asia and Pacific Regional Bureau for Education, 73-77.
- UNESCO. (2010a), *ICT Transforming Education: A Regional Guide*, Bangkok, Thailand, UNESCO Asia and Pacific Regional Bureau for Education.
- UNESCO. (2010b), *UNESCO National Education Support Strategy (UNESS): Cambodia 2010-2013*, Phnom Penh, Kingdom of Cambodia, UNESCO Phnom Penh Office.
- UNESCO. (2013), *ICT in Education: Policy, Infrastructure and ODA Status in Selected ASEAN Countries*, Bangkok, Thailand, UNESCO Asia Pacific Regional Bureau for Education.
- UNESCO. (2015), *Education 2030, World Education Forum 2015*, Retrieved June 21, 2019, from <https://en.unesco.org/world-education-forum-2015/incheon-declaration>.
- Wei, L. M., et al. (2016), Relationship between Teacher ICT Competency and Teacher Acceptance and Use of School Management System (SMS). *Malaysian Online Journal of Educational Technology*, 4 (4), 36-52.
- World Bank Group. (2010), *Cambodia: Review of Government Information and Communication Technologies (ICTs) Policies and Investments. Policy Note*, Phnom Penh, Kingdom of Cambodia, World Bank Group.

## Appendix

**Table 8.** Loaded factors for teacher educators' attitudes towards ICT in education items

Statements	Loading	Factors	$\alpha$
A02. Working with computers makes me feel tense and uncomfortable*	.735	Affective	.75
A05. Using computers is enjoyable	.587		
A06. I dislike using LCD projectors and computers in teaching*	.409		
A07. The use of ICT is not enjoyable*	.729		
A12. Computers, smart phones, LCD projectors, and an Internet connection are necessary for my classroom	.590	Cognitive	.83
A14. The integration of ICT in the classroom encourages improvements in the teaching-learning process	.480		
A15. ICT helps me discuss teaching ideas with others effectively	.781		
A17. ICT helps me treat students with special educational needs	.428		
A19. If I had the money, I would buy a computer, a printer, and have an Internet connection at home	.603	Behavioral	.71
A21. I am willing to receive training in ICT use to integrate it into the teaching-learning process to improve my teaching quality	.718		
A23. I would like to learn more about computers	.828		
A24. I use ICT in teaching if the relevant equipment is available at school	.700		
Teacher Educators' Attitudes towards the Use of ICT in Education in education items			.84