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Bhutanese Teacher Educators' Attitudes Towards Information and Communication Technology Acceptance and use in Teaching: Implications for Rural Developing Countries

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Abstract

Information and Communication Technology is a powerful tool for transforming education, and in developing, largely rural countries such as Bhutan, where its widespread access is relatively recent. Information and Communication Technology acceptance and use among teacher educators are crucial for effective contemporary teacher education. Acceptance and use depend on well-established factors, including teachers' attitudes; however, little is known about teachers' attitudes in rural developing countries, especially Himalayan and Buddhist countries, which are culturally different to other developing countries. Accordingly, this mixed-method study investigated how Bhutanese teacher educators' attitudes influence acceptance and use of Information and Communication Technology in teaching. Analysis of survey (n = 90) and semi-structured interview (n = 21) data indicated that teacher educators generally held positive attitudes toward its use. Age, gender, teaching experience and subject of specialisation did not influence attitude, while perceived usefulness, facilitating conditions and Information and Communication Technology use, did. Positive attitude was associated with perceived usefulness, while negative attitude aligned with Information and Communication Technology incompetence and slow internet connectivity. Some agreement exists between findings in Bhutan and other developing, rural contexts, however, differences in factors, including gender, and the presence of Buddhist *zhenphen* highlight the need for policymakers, researchers and interventions to account for context, alongside continued improvement of Information and Communication Technology infrastructure.

Keywords: *perceived usefulness, facilitating conditions, Bhutan, developing countries, zhenphen, ICT competency*

Introduction

In today's rapidly evolving educational environment, Information and Communication Technology (ICT) is a pivotal force in transforming teaching in rural developing contexts. International organisations such as the United Nations emphasise the importance of ICT in education to "*substantially increase the proportion of youth and adults with information and communications skills*" necessary to achieve sustainable development (*Sustainable Development*

Goal 4)(United Nations General Assembly, 2015, p. 21), and aim to ensure that teachers have the requisite skills to use ICT for enhancing learning outcomes (United Nations Educational, Scientific & Cultural Organization [UNESCO], 2011). Similarly, the Action Plan of the Asia-Pacific Economic Cooperation Education Strategy 2016-2030 emphasises the use of ICT in education to improve quality, access, and relevance (Asia-Pacific Economic Cooperation [APEC], 2010). There is broad international commitment to achieving these goals, including aid to developing countries, such as Pacific nations (funded, e.g., by the Australian Government) (Asian Development Bank, 2018) and Bhutan, funded by United Nations Educational, Scientific and Cultural Organisation (Wong, 2008, as cited in Kinley, 2015). Many developing countries are classified as rural in nature, including Afghanistan, Bangladesh, China, India, Nigeria, Pakistan, Serbia and Vietnam; and also Bhutan, where 57% of the population live in rural areas (International Fund for Agricultural Development, 2024). However, compared with their developed counterparts, developing countries are still lagging in successful integration of ICT in education (Liu & Yuan, 2015).

The delayed progress of rural developing countries in using ICT in education can be conceptualised as originating from first and second-order barriers (Ertmer, 1999). First-order barriers to technology acceptance and use are external to the teacher and include training, support and access to resources. On the other hand, second-order barriers are internal factors, including users' attitudes and beliefs about technology (Ertmer et al., 2012). Governments invest heavily in ICT integration (Lawrence & Tar, 2018), focusing on first-order barriers, and governments of rural developing countries are no exception; for instance, Bhutan's national policies both position ICT integration as vital to preparing students for adulthood, and provide support to reduce first-order barriers (Ministry of Education, 2019; Royal Government of Bhutan, 2018). However, in the country's two colleges of education, despite national and international policy direction and funding for infrastructure, equipment and training, integration of ICT in pedagogy is still limited. Bhutanese educators use few ICT tools (Chewang, 2017), and ICT implementation is mostly limited to using virtual learning environments (VLE) (Choeda et al., 2016). Thus, second-order barriers are implicated in understanding why ICT is not better integrated in this and other rural developing nations in which first-order barriers have been at least somewhat met. Further, there are significant numbers of studies on the relationship between pre-service and in-service teacher attitude towards technology and ICT integration in developed nations, for example, in Taiwan (Hong et al., 2022), the United States (Ottenbreit-Leftwich et al., 2018), Australia (Reyes et al., 2017), and Belgium (Scherer et al., 2018). However, similar studies in developing countries are limited, and almost no literature examines Himilayan or Buddhist contexts. In response, the present study establishes the attitudes and beliefs of Bhutanese teacher educators and how these relate to ICT acceptance and use. It offers ways to increase technology integration in Bhutan, and provides a useful reference point for other rural developing countries.

Teacher Educators' Attitudes Towards the use of Information and Communication Technology

An individual's attitude guides behaviour in coherence with their feelings and thoughts (Semerci & Aydin, 2018), and attitude plays a vital role in the acceptance and use of ICT in teaching. In this context, attitude is the degree to which educators have positive or negative affect in relation to the use of ICT in the teaching and learning process (Lawrence & Tar, 2018); their feelings, likes, and dislikes about technology (Joyce & Kirakowski, 2014). As attitude guides behaviours, teacher attitude towards technology is an important determinant of technology acceptance and use in classrooms. This relationship is clear in countries well-established in using technology for teaching and learning. For example, Kreijns et al. (2013) studied the effects of Dutch primary and secondary school teacher attitude, social norm and self-efficacy on use of digital learning materials. Of these three factors, attitude had the strongest relationship with intention to use

digital learning materials. Similarly, in Korea and Vietnam university students' attitude was the primary factor determining acceptance and use of e-learning, and, the more favourable a student's perception of e-learning, the stronger their willingness to continuously use it (Jo, 2022). Positive attitudes towards technology are shared by educators in less developed, rural countries, however, the relationship between attitude and technology use is less straightforward. In India, teacher educators displayed a positive attitude towards technology-enabled learning (Adhya & Panda, 2022) as did teacher educators in Pakistan (Ahmed & Kazmi, 2020). Similarly, educators in Nigeria reported positive attitudes towards the use of instructional and web-based technologies (Ibrahim & Shiring, 2022). However, positive attitude does not always result in strong technology integration. For instance, in Oman, while university teachers had positive beliefs about and attitudes towards ICT use in education, this did not necessarily mean that they integrated ICT into their teaching processes (Abdelrahman et al., 2019). Similarly, Noori (2018) found that Afghan English as a Foreign Language lecturers demonstrated highly positive attitudes toward ICT use but only a moderate level of integration in their classrooms. Despite positive attitudes towards technology, reluctance to integrate technology in teaching persists in some places where technology use is still emerging.

Factors Associated with Teacher Educators' Attitudes Towards the use of Information and Communication Technology in Teaching

Educators' attitudes towards acceptance and use of technology in teaching across contexts is associated with several factors. Chief among these are *perceived usefulness* and *perceived ease of use*. Focusing on rural contexts, in Nigeria, teacher educators' positive attitude is associated with both their perceptions of the usefulness of the technology and how easy it is to use (Ibrahim & Shiring, 2022). Similarly, these two factors were positive influences on pre-service teachers' attitudes in Serbia (Teo et al., 2016). In Palestinian schools, Khlaif (2018) found the factors associated with teachers' positive attitudes towards the integration of tablets into their classrooms included that they improve quality of education, especially in rural areas (perceived usefulness) and are easy to use. Other studies note factors beyond perceived usefulness and perceived ease of use. For instance, Khlaif and Salha (2022) found that Palestinian university students' attitudes and beliefs towards mobile technology integration were influenced by previous experience and social factors (influence of instructors and colleagues) alongside technical factors that facilitate ease of use, such as support from the institution and the quality of mobile service. Similarly, Xue et al. (2023) revealed that socially oriented factors regarding rules, community, and division of labour impacted on technology integration in Chinese universities, and technology integration was influenced differently in public and private institutions.

Just as there are factors that have a positive influence on the acceptance and use of ICT in teaching, there are also factors associated with negative attitude. For example, Herro et al. (2021) found that limited time, large class sizes, vast amounts of content to cover and little incentive to change practice impacted negatively on teacher educators' attitudes towards technology integration. Other negative factors include conservative rules about ICT usage and limited administrative support (Xue et al., 2023) as well as the perceived difficulty and complexity of ICT, and thus, time and effort required to use it (Teo et al., 2016; Wang & Zhao, 2023). Clearly, there are factors associated with positive and negative attitudes of teacher educators towards acceptance and use of technology in education. However, these factors are by no means universal, and little is known about the factors impacting attitude in developing Himalayan rural contexts like Bhutan, a gap in the literature that the current research seeks to fill.

Alongside perceived ease of use, usefulness of technology, and socially oriented factors, attitude is also influenced by educator demographics. Demographic factors associated with teacher educators, pre-service teachers and teachers' attitudes towards technology integration in rural developing countries include age (Ahmed & Kazmi, 2020; Makhlouf & Bensafi, 2021; Noori, 2018),

gender (Ahmed & Kazmi, 2020; Cai et al., 2017; Makhlouf & Bensafi, 2021), teaching experiences (Ahmed & Kazmi, 2020), and ICT competency (Noori, 2018). For instance, Cai et al.'s (2017) meta-analysis of gender differences in attitudes toward technology indicated that, overall, males held a significantly more favourable attitude towards technology use than females, although these differences had small effect sizes. In Algeria, teacher age had a negative correlation with attitude (Makhlouf & Bensafi, 2021). In Afghan public universities, lecturers' demographic factors such as age, computer training experience, and computer competency were also found to significantly correlate with teachers' attitudes toward instructional technology (Noori, 2018). However, in nearby Pakistan and India, teacher educators' age did not influence their attitude towards the use of technology, nor did gender or teaching experience (Adhya & Panda, 2022; Ahmed & Kazmi, 2020). Relationships between demographic factors and educators' attitude toward ICT varies between rural developing countries and in different cultural contexts. Yet, there is limited knowledge about how the demographic characteristics of teacher educators influence their ICT acceptance and use in teaching in rural Himalayan and Buddhist countries, such as Bhutan, in which the demographics and culture are quite different to other rural Asian and middle eastern countries. Investigating the influence of demographic factors in Bhutan may provide valuable insights for policymakers and curriculum developers aiming to enhance ICT use in education both in Bhutan and rural countries that share similar demographic profiles intersecting with similar cultures.

Current Study

Numerous studies have explored the attitudes of teachers towards technology use in the school context, with a limited focus on university educators and specifically teacher educators. Existing research has primarily focussed on educator attitude rather than the relationship between attitude and factors that may impact ICT acceptance and use. Although there have been a few studies conducted on ICT integration in Bhutan (Chewang, 2017; Choeda et al., 2016; Kinley, 2015), and education more broadly (Kaka et al., 2022), none have specifically investigated attitudes of teacher educators towards ICT acceptance and use in teaching. The current study investigated teacher educators' attitudes and how they influence ICT acceptance and use in teaching and learning processes in Bhutan. This study also sought to reveal the specific attitudes and influencing factors within the rural Bhutanese context where technology is very new; indeed, in 1999, Bhutan became the last country on Earth to legalise television and internet, with mobile phones coming to Bhutan as late as 2003 (Wangmo & Cokley, 2009). As such, it builds on other scholarly activity that focuses on developing countries from a rural perspective, such as Serow et al.'s (2016) research on initial teacher education in Nauru. The current study offers insight for policymakers and education leaders in such countries on ways to change teacher educators' attitudes from negative to positive, which is crucial for the adoption and utilisation of ICT in teaching.

The following research questions will be addressed:

(1) What are teacher educators' attitudes towards ICT acceptance and use in Bhutanese teacher education colleges?
(2) What is the relationship between attitude and other factors that may impact on ICT acceptance and use?
(3) Is there a difference between teacher educators' attitudes towards the integration of ICT in teaching by age, gender, teaching experience, and subject of specialisation?

Method

Research Methodology

The study adopted a mixed method approach chosen to address the research questions, which demanded a purposeful application of a multiple-perspective approach as attitudes are highly subjective constructs. Ethical approval was gained from the authors' institution (ethical clearance No. HE22-191) and from the two education colleges where data was collected. A survey was administered to 90 Bhutanese teacher educators who volunteered to take part in the study. Semi-structured interviews were conducted with 21 of these teacher educators to gain further insight.

Participants

Volunteering sampling was used to collect data from a total of 90 teacher educators who completed the online survey, with 79 valid responses (females: 28, 35.5%, males: 50, 63.3%). It is noted that due to the method of sourcing participants, the sample was not a random one. In total, 21 teacher educators volunteered and were selected for a semi-structured interview. The participants' demographic information is presented in Table 1.

Table 1: ***Demographic Information of the Participants****

Variables	**Frequency**	**Percentage (%)**
Gender		
Male	50	63.3
Female	28	35.5
Age		
Less than 29	5	6.3
30-39	13	16.5
40-49	32	40.5
50-59	28	35.4
Teaching experience		
Below 10 years	6	7.6
10-20 years	19	24.1
21-30 years	45	57
Above 30 years	8	10.1
Subject of specialisation		
Science/Mathematics	24	30.3
Arts	24	30.3
Professional	30	37.9

Note. *One value missing as one respondent chose not to answer these demographic questions.

Instruments

Survey. The survey consisted of two distinct sections: one measured teacher educators' demographic information (gender, age, experience and subject of specialisation), and one measured their attitude towards acceptance and use of ICT in the teaching and learning process. There were 24 items under two sections and all items used four-point Likert scales, with 1

indicating *strongly disagree* to 4 indicating *strongly agree* (see Table 2). Items were piloted with a small group of teacher educators who were similar to the sample.

Table 2: ***Survey Items***

Section A: Demographic characteristics				
1. My sex is: Male Female Others		**3. My teaching experience is:** Below 10 years 11-20 years 21-30 years Above 30 years		
2. My age in years is: 29 and less 30-39 40-49 50-59 60 and above		**4. My Subject of specialisation is:** Maths/Science Professional Arts		
Section B: attitude towards acceptance and use of ICT in teaching				
Components	1	2	3	4
Attitude				
1. I like to integrate Information and Communication Technology (ICT) in my teaching				
2. I like to use ICT to assess and evaluate students' work				
3. I feel positive about using ICT in teaching				
4. The use of ICT increases my job satisfaction				
Perceived usefulness				
5. I believe ICT has potential to improve my ability to teach				
6. The ICT integration in teaching improves the academic performance of learners				
7. Integrating Information and Communication Technology (ICT) enables me to deliver my lesson more effectively.				
8. Integrating ICT improves my instruction in the class				
9. Using ICT can save me a lot of time to teach the course materials				
Perceived ease of use				
10. It is easy for me to become skilful at using ICT				
11. I find it easy to integrate ICT in my lesson				
12. It takes too long to learn how to integrate ICT in teaching-Reversed				
Facilitating conditions				
13. A variety of computer software programs are available for use in the college				
14. I have received adequate training to incorporate ICT into my teaching				
15. IT support staff are available to support ICT integration in my teaching				
16. The technical infrastructure is not adequate in the college- reversed				
ICT usage				
17. I use ICT to keep track of students' learning				
18. I use technology to provide feedback to students				
19. I use technology to assess students' learning				
20. I use technology in a variety of ways to teach a lesson				

Note. 1. Strongly Disagree; 2. Disagree; 3. Agree; 4. Strongly Agree

Semi-structured Interview. Following piloting and revision, ten interview questions based on teacher educators' attitude towards ICT acceptance and use were used for the study (see Figure 1). The 60-minute semi-structured interview applied a relatively open and flexible approach that allowed for in-depth dialogue during the interview, the opportunity to change the sequence of questions and an easy shift from one question to the next (Kallio et al., 2016).

Figure 1: ***Interview Questions***

1. How do you feel about integrating ICT in your teaching?
2. Do you like integrating ICT in your teaching? (Why)
3. What can you say about your experience of using ICT in teaching?
4. As a teacher educator, is it important to consider using ICT in teaching?
5. What are the factors that influence your attitude towards ICT integration in teaching?
6. What are the factors that demotivate you to use technology in your teaching?
7. What specific characteristics of the technology influence your decision to use it?
8. What kind of knowledge or skills do you have to manage to integrate ICT in your teaching?
9. Do you consider yourself a confident user of ICT?
10. Can you share any other thoughts regarding ICT integration in education colleges?

Data Analysis

After establishing reliability, the mean scores from components within the survey were combined. The following components derived from the survey were applied in quantitative analysis: attitude, perceived usefulness, perceived ease of use, facilitating conditions, and ICT usage. To answer research question one, descriptive statistics were used to overview the trends in participants' attitude towards ICT acceptance and use. To answer research question two, Pearson correlation was applied to examine the relationship between attitude and other components such as perceived usefulness, perceived ease of use, facilitating conditions and ICT usage. To answer research question three, mean score, Cohen's d value and Eta-squared were used to compute the effect sizes between teacher educators' demographic characteristics and attitude towards the acceptance and use of technology. The conventions for relative magnitude of effect size were drawn from Cohen et al. (2018).

Qualitative data was also used to answer research questions one, two and three. The qualitative data (interview) was analysed using the 6-phase methodology of thematic analysis as described by Braun and Clarke (2006). The recorded sessions were transcribed and imported into the digital qualitative data analysis program, NVivo. An inductive data-driven approach was applied at the semantic level. The following steps were undertaken to analyse the interview data:

- An initial familiarisation of data involving multiple readings of the corpus of participant discourse from semi-structure interviews
- The systematic generation of initial codes
- The collation of codes into provisional themes
- The review of themes and production of a thematic map
- Finalisation and naming of themes (Matthews, 2021)
- Conceptual maps and reference numbers were used to describe and interpret the data.

Results

Internal Consistency Reliability

Cronbach's alpha was calculated to determine the reliability of the items for each component of the survey. A minimum of .70 is typically considered adequately robust (Birch & Irvine, 2009). All components (attitude, perceived usefulness, perceived ease of use, facilitating conditions and ICT usage) were shown to possess acceptable magnitudes of Cronbach's alpha as shown in Table

3. When an item ('The use of ICT increases my job satisfaction') under the attitude component was deleted, the alpha was increased to .763.

Table 3: ***Internal Consistency Reliability***

Components	Cronbach's Alpha	Number of Items
Attitude	.763	3
Perceived usefulness	.834	5
Perceived ease of use	.834	3
Facilitating conditions	.786	4
ICT usage	.869	4

Component Creation

With item reliability established, the means were used to combine the items for components. Perceived usefulness, perceived ease of use, facilitating conditions and ICT usage retained all of their items from the survey. For attitude, one item ('The use of ICT increases my job satisfaction') was omitted to increase the alpha value for the component. The kurtosis and skewness of each variable was shown to indicate adequate levels of normality of the data for all five of the components (i.e., between -1 and +1 for skewness and a value of close to zero for kurtosis).

Research Question 1

Quantitative Results. The overall mean of the attitude component (see Table 4) is 3.43, which is the highest among components. It inclines towards 4, which equates to strongly agree on the 4-point Likert scale applied in the current research. This indicated that in general, Bhutanese teacher educators had positive attitudes towards ICT use and acceptance in teaching.

Table 4: ***Descriptive Statistics of the Components***

Component	Number of teacher educators (N)	Mean	Standard Deviation
Attitude	79	3.43	.493
Perceived usefulness	79	3.34	.434
Perceived ease of use	79	2.69	.551
Facilitating conditions	79	2.44	.552
ICT usage	79	3.13	.518

Note: 1 = Strongly disagree; 2 = Disagree; 3 = Agree; 4 = Strongly agree

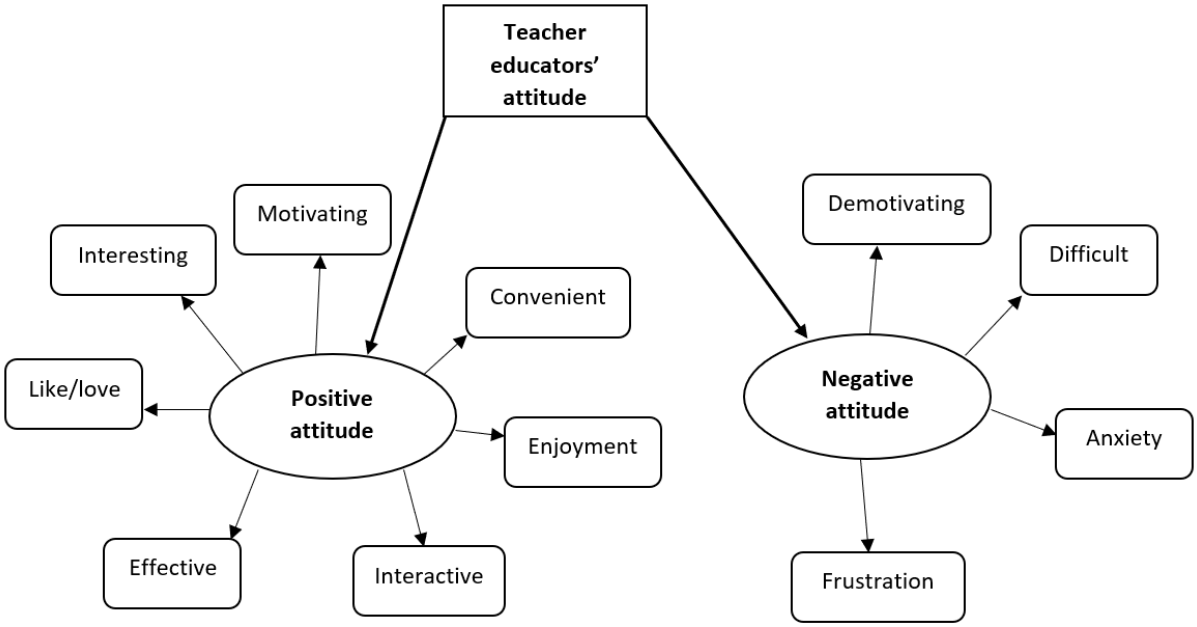
The mean attitude score was raised by teacher educators' higher ratings for items, 'I like to integrate ICT in my teaching' (*M* = 3.47, *SD* = 0.637) and 'I feel positive about using ICT in teaching' (*M* = 3.46, *SD* = 0.595). However, participant perception in relation to perceived ease of use and facilitating conditions was rated relatively low. The perceived ease of use scores appear to have been affected by teacher educators reporting lower competency for the following item: 'It takes too long to learn how to integrate ICT in teaching' (Reversed) (*M* = 2.27, *SD* = .693). The rating for facilitating conditions was lowest with a mean score of 2.44. The mean score of teacher educators' perception of existing facilitating conditions appears to have been affected by the following items: 'I have received adequate training to incorporate ICT into my teaching' (*M* = 2.06, *SD* = .704) and 'A variety of computer software programs are available for use in the college' (*M* = 2.53, *SD* = .782).

Qualitative Results. Thematic analysis of interview data resulted in two salient themes being identified: 'positive attitude towards ICT' and 'negative attitude towards ICT', seen in Figure 2. In total, 209 sections of discourse were coded, with 172 of these coded under the theme of positive attitudes towards ICT and 37 coded under the theme of negative attitudes toward ICT. Discourse coded under the theme, 'positive attitude towards ICT', was further classified into sub-themes including 'like/love', 'interesting', 'motivating', 'convenient', 'enjoyment', 'interactive' and 'effective' (see Table 5). Similarly, discourse coded under the 'negative attitude towards ICT' theme was further classified into sub-themes: 'frustration', 'anxiety', 'difficulty' and 'demotivating'. The most prevalent sub-themes under positive attitude were 'interest' and 'like/love' towards use of ICT in teaching and learning, indicating that the participating teacher educators have ample positive attitudes towards ICT integration (see Table 5). The most prevalent sub-theme under negative attitude was 'frustration' when technology does not work as anticipated and due to inadequate resources.

Table 5: ***Key Themes Generated on Teacher Educators' Attitude from the Interview Data Through Thematic Analysis***

Themes	Sub-themes	Number of references	Example from participants' responses
Positive attitude	Interest	49	TE15: "*I am interested in integrating ICT in my teaching.*"
	Like/Love	31	TE04: "*I love integrating technology in my teaching*".
			TE10: "*I really like to integrate technology in my teaching and learning*."
	Effective	30	TE18: "*ICT integration makes a [sic] teaching very effective*."
	Interactive	28	TE16: "*Using digital technologies make teaching very interactive. For instance, Nearpod makes teaching interactive and fun*."
	Enjoyment	14	TE20: "*I enjoy integrating technology in the class.*"
	Convenient	12	TE15: "*ICT tools like Padlet are very convenient to use as it is easy to view and comment*."
	Motivating	8	TE12: "*I am motivated to use to learn various technologies and use it in my teaching.*"
Negative attitude	Frustration	14	TE01: "*When technology does not work or we do not get access to the internet and other ICT facilities, things become a little tricky and frustrating*."
	Anxiety	6	TE20: "*Sometimes the technology increases my anxiety in a class*."
	Difficulty	9	TE16: "*It becomes very difficult for us to catch up new technology.*"
	Demotivating	8	TE02: "*I get demotivated due to low speed of internet.*"

Figure 2: ***Thematic Map Showing Teacher Educator Attitudes Towards ICT Acceptance and use in Teaching***



Research Question 2

Quantitative Results. Pearson correlation was applied to interrogate the strength of the relationship between attitude and other components—'perceived usefulness', 'perceived ease of use', 'facilitating conditions' and 'ICT usage'. The Pearson product-moment correlation coefficients among these variables ranged from .12 to .56. Table 6 shows that attitude had a moderate positive correlation with 'perceived usefulness' (r = .565, p < .001). 'Attitude' had a weak positive correlation with 'facilitating conditions' (r = .278, p < .013) and 'ICT usage' (r = .349, p < .002). However, there was no statistically significant correlation between 'attitude' and 'perceived ease of use' (r = .127, p =.266).

Table 6: ***Correlations Between Attitude and Other Factors***

Constructs		Perceived usefulness	Perceived ease of use	Facilitating conditions	ICT usage
Attitude	*R*	.565**	.127	.278*	.349*
	Sig (2 tailed)	*p* < .001	*p* = .266	*p* < 0.013	*p* < .002

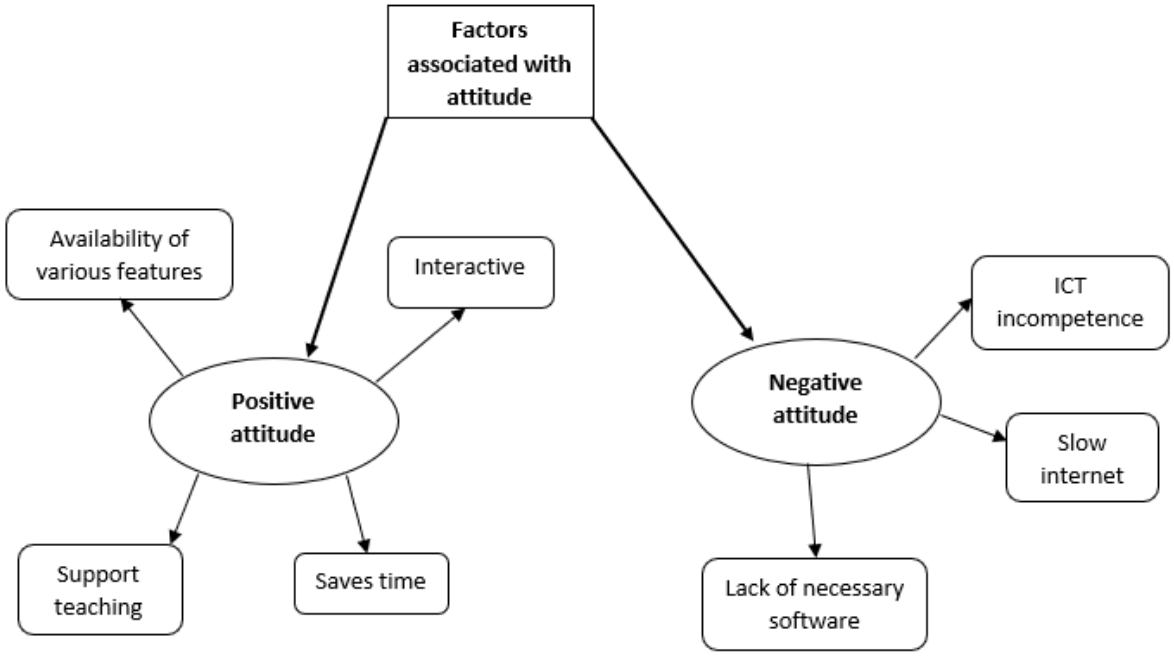
Note: * and ** denote significant correlations at the 0.05 and 0.01 significance levels. Significance results are only to be considered as indicative since the sample is not random.

Qualitative results. Thematic analysis of interview data further revealed that positive attitudes toward ICT were associated with following sub-themes: 'availability of various features', 'interactive', 'support teaching' and 'saves time' (Figure 3). The prominent sub-themes causing teacher educators' positive attitudes towards ICT are the 'availability of various features' and making teaching 'interactive' (see Table 7). The negative attitudes towards ICT were linked to several sub-themes: 'ICT incompetence', 'slow internet', and 'lack of necessary software' (Figure 3). The most prominent sub-themes contributing to negative attitudes towards ICT are teacher educators' 'ICT incompetence' and 'slow internet' connectivity at the college (Table 7).

Table 7: ***Key Themes Generated on Factors Associated with Attitude from Interview Data Through Thematic Analysis***

Themes	Sub-themes	No. of refs	Example from participants' responses
Factors contributing to positive attitudes	Availability of various features	25	TE14: "*VLE has many features and the features [sic] known as Debate is my favourite ICT nowadays*."
	Interactive	33	TE20: "*I enjoy integrating technology as it makes my lesson more interactive*."
	Support teaching	5	TE11: "*I like using ICT in my teaching as it supports my teaching*."
	Saves time	6	TE21: "*I use Padlet because it is very convenient. I can see everybody's response on one page. So, it saves a lot of time*."
Factors contributing to negative attitudes	ICT incompetence	15	TE01: "*I feel frustrated when I can't fully navigate and utilise technology the way I want to.*"
	Slow internet	5	TE01: "*It can be pretty frustrating when you are not able to teach as you planed due to slow internet connectivity*."
	Lack of necessary software	4	TE20: "*I get frustrated when I do not get required software in the college*."

Figure 3: ***Thematic Map Showing Factors Associated with Teacher Educators' Attitude***



Research Question 3

The mean score for male teacher educators' attitude towards ICT acceptance and use was higher than female teacher educators as shown in Table 8. However, the effect size as measured by Cohen's d was below 0.5 indicating a small effect (Cohen et al., 2018). This indicated that gender

has negligible impact on teacher educators' attitudes. Regarding age, senior teacher educators' mean score was higher than young and mid-career but the Eta-squared value is 0.06 which is very low indicating no impact of age on teacher educators' attitudes. Similarly, the mean score for teacher educators having more than 30 years of teacher experience is higher than other categories, but a low Eta-squared value of 0.01 indicated no impact of teaching experience on the attitude. The mean score for Mathematics and Science teacher educators was higher than Arts and Professional teacher educators. However, a small effect size of 0.11 indicated neither subject of specialisation impacts the attitude.

Table 8: ***Teacher Educators' Attitude and Demographic Factors***

Demographic category	**Mean attitude**	**Standard deviation**	**Effect size Cohen's d (*d*)/Eta squared(η^2)**
Gender			
Male	3.51	.504	*d* = 0.44
Female	3.29	.448	
Age			
Young	3.38	.585	
Mid-career	3.32	.452	η^2= 0.06
Senior	3.59	.447	
Teaching experience			
Below 10 years	3.27	.443	
10-20 years	3.43	.583	η^2= 0.01
21-30 years	3.44	.455	
Above 30 years	3.50	.563	
Subject of specialisation			
Science or Maths	3.66	.428	
Arts	3.40	.450	η^2= 0.11
Professional	3.26	.520	

Discussion

This study investigated Bhutanese teacher educators' attitudes towards ICT acceptance and use in teaching at two education colleges in Bhutan. Although the relationship between attitude towards ICT and its acceptance and use has been considered previously in developed and developing countries (e.g., Cai et al., 2017), the current study provides further insight into the under-represented rural contexts and cultures of Asian, Himalayan and Buddhist countries, in which ICT is still a relatively new phenomenon. Attitude as a second-order barrier was also investigated by this study, which assumed that first-order barriers, such as access to hardware and infrastructure (Ertmer et al., 2012), are largely addressed in such countries, leaving second-order, internal barriers, such as attitude, the ongoing obstacles to effective ICT integration.

In consideration to the result of research question one, quantitative analysis revealed that among the five components ('attitude', 'perceived usefulness', 'perceived ease of use', 'facilitating conditions' and 'current ICT usage'), 'attitude' has the highest mean score. In general, then, Bhutanese teacher educators have positive attitudes towards ICT acceptance and use in teaching, which concurs with other studies in this field (Adhya & Panda, 2022; Ibrahim & Shiring,

2022; Noori, 2018). Despite positive attitudes towards technology, however, some Bhutanese teacher educators are limited in their integration of ICT in teaching, aligning with similar findings in other rural developing contexts (e.g., Abdelrahman et al., 2019; Noori, 2018). Nevertheless, most teacher educators held positive attitudes such as a strong 'liking/love', 'interest' and 'enjoyment' for ICT in their teaching. Participants also expressed that technology integration in teaching is 'convenient', 'motivating' and makes teaching 'interactive' and 'effective'. On the other hand, some teacher educators found ICT integration 'frustrating', 'anxiety-inducing', 'difficult' and 'demotivating'. Similar feelings are experienced more universally, for example, by pre-service (Rehmat & Bailey, 2014) and in-service teachers (DeCoursey, 2012) in metropolitan contexts. While most Bhutanese teacher educators had positive attitudes towards technology, as is the case in other rural developing countries, for teacher educators experiencing anxiety, frustration and demotivation, implementing strategies focused on making ICT integration less difficult will improve their use of ICT in teaching. Further, while shifting attitude will improve the use of ICT in teaching, understanding the relationship between 'attitude' and other factors that may impact ICT acceptance and use will assist stakeholders (policy makers, administrators, educators, etc.) target strategies to best effect.

Regarding the relationship between 'attitude' and other factors (Research Question 2), quantitative data analysis revealed teacher educators' attitudes had a moderate positive correlation with 'perceived usefulness' as in the case of other studies (Al Amin et al., 2023; Ibrahim & Shiring, 2022). 'Perceived usefulness' contributing to positive attitude was further defined in thematic analysis of interview data. For instance, the availability of various technological affordances and the value of ICT in making teaching interactive were prominent in the discourse of Bhutanese teacher educators with positive attitudes. This finding supports earlier studies where positive educator attitude was caused by the notion that technology facilitates teaching (Khlaif, 2018). Even though 'attitude' is not statistically significantly correlated with 'perceived ease of use', interview data analysis revealed 'ICT incompetence' as a main cause of negative attitudes toward ICT acceptance and use in teaching. Similar perceptions were noted in rural developing countries, such as Bangladesh (Al Amin et al., 2023). To this end, policymakers and education leaders in rural developing countries should focus on providing comprehensive training and professional development programs to improve general ICT competence and thus improve the use of ICT in teaching. At the same time, to foster positive attitudes, training and professional development should promote perceived usefulness of ICT in teaching by showcasing the technological features and the value of ICT for making teaching interactive. Furthermore, while perceived usefulness and ease of use are important, the power of social influence is not to be underestimated (Khlaif & Salha, 2022; Xue et al., 2023). As a Buddhist country, the people of Bhutan practice zhenphen, the Buddhist principle of acting to benefit others (Rabgay & Kidnam, 2023). Because of this, Bhutanese people are specially motivated to help each other. This goodwill may be leveraged to support people with lower levels of ICT competency and/or negative attitudes towards ICT. Further, people with positive attitude and high levels of ICT competency are likely to be very willing to mentor their colleagues. Efforts to develop positive attitude and ICT competence may be strengthened by considering the role of zhenphen in professional development, and this is an area for future study applicable to Buddhist contexts.

Quantitative data revealed attitude has a small positive correlation with facilitating conditions and ICT usage. As per the interview data analysis, another prominent factor that caused negative attitude in Bhutanese teacher educators was slow internet connectivity in the colleges, which inhibits ease of use. This undermined our assumption that first-order barriers were already sufficiently addressed in Bhutan. Clearly, in the Bhutanese colleges of education, the first-order barriers of poor internet connection and lack of necessary software persist. Further, the findings highlighted the connection between first- and second-order barriers, in which poor infrastructure (first-order barrier) results in poor attitude (second-order barrier). This is likely an issue of particular importance for other rural developing countries where infrastructure has been

provided but may still be lacking in quantity or quality. Following established frameworks, such as United Nations Educational, Scientific and Cultural Organisation's *ICT Competency Framework for Teachers* (UNESCO, 2011) and Asia-Pacific Economic Corporation's *Education Strategy 2016-2030* (APEC, 2016), local governments and global partners must continue to provide infrastructure, digital tools, and training programs to empower educators in rural developing countries to leverage technology for better learning outcomes.

In response to Research Question 3, consistent with other studies (Adhya & Panda, 2022; Ahmed & Kazmi, 2020), there is no impact of gender, age, teaching experience and subject of specialisation on teacher educators' attitude towards ICT acceptance and use in teaching. However, other studies found that gender, age and experience do influence attitude (Cai et al., 2017; Makhlouf & Bensafi, 2021; Noori, 2018), indicating demographic influences are context-dependent. While gender, age, teaching experience and subject of specialisation did not influence teacher educator attitude in Bhutan, gender is a significant factor in other developing, largely rural countries. Men and women differ in terms of ICT attitude and skill in Bangladesh and the Philippines (Rashid, 2016), and males still hold more favourable attitude towards general technology use than females in developed countries, including in the North American and Asian contexts (Cai et al., 2017). Bhutan, it seems, is bucking the gender trend in Asia that is attributed to social and cultural norms (Cai et al., 2017). One reason for Bhutan's difference may be that Buddhism sees men and women as equal (of note, Cai et al.'s (2017) study did not include Buddhist Asian countries). Notwithstanding persistent norms around gender, for example, about household chores and child rearing (Aguilar, 2013), Bhutan has also made special efforts over the past few decades to promote gender equality and become "*one of the most gender equal countries in Asia*" (Kotikula, 2013, cited in Aguilar, 2013, p1). As gender equality in other rural Asian countries improves, negative attitude among women towards ICT in education should also improve. In the meantime, to improve ICT use in all contexts, when gender is determined as a factor at play, interventions should be designed and targeted accordingly.

Conclusion

Enhancing the acceptance and integration of ICT in teaching and learning necessitates a crucial shift in the attitudes of teacher educators (Kreijns et al., 2013; Wang & Zhao, 2023). For the Asian, Buddhist teacher educators of the rural Himalayan country of Bhutan in the current study, while most educators displayed a positive attitude towards ICT acceptance and use, some expressed anxiety, frustration, demotivation and difficulty which deter technology integration. It is important to note that although the challenges faced by the teachers in the two semi-urban colleges (Paro and Samtse) are likely to be comparable to those experienced by teachers working in more remote rural areas, teachers working in even more remote rural locations are likely to experience even more pressing challenges in relation to the integration of ICT in their teaching. This is an important consideration when generalising the findings of this study more broadly across the country of Bhutan. Reluctance in implementing ICT is shared by educators in other rural developing countries, however, underlying factors that influence attitude in the first place are different in Bhutan. Perceived usefulness of technology has strong association with positive attitudes in Bhutanese educators, but this factor is not as prominent in other similar countries. On the other hand, feelings of incompetence are widely experienced in Asian developing rural contexts (e.g., Al Amin et al., 2023; Wang & Zhao, 2023). Similarly, while gender is a factor associated with attitude among many Asian countries, it was not a factor in Bhutan. This indicates the need for careful consideration of the contextual factors underpinning attitude to best leverage contextual strengths and target intervention in rural developing countries; while these countries may have similar levels of infrastructure and experience in using technology in education, not all influencing factors are homogenous, even among, for example, Asian countries. Indeed, more nuanced investigations of culture are warranted, and the present study

highlights as an area for further investigation—the relationship between Buddhism and attitude towards ICT acceptance and use, especially regarding the notion of zhenphen. Finally, first-order infrastructure barriers persist in Bhutan and influence the second-order attitudinal barrier. Rural developing countries like Bhutan, then, still need intra-governmental and global support to improve infrastructure as a fundamental driver of positive attitudinal shift, alongside initiatives that emphasise the benefits of ICT, including its interactivity and time saving capabilities.

In terms of limitations, this study focused solely on teacher educators in Bhutan and data was collected from among a relatively limited sample size, although it included participants from both of Bhutan's teacher education institutions. Further, it is important to note that given the nature of sampling and the relative size of the sample, there are potential biases within it. These limiting attributes of the current study's sample could be ameliorated in future related result through more extensive, random sampling. Findings are therefore limited in their generalisability, although there is some transferability to contexts or populations within similarities with Bhutan. Despite limitations, the current study applied a correlational approach to successfully map out the terrain of important attitudinal components in Bhutanese teacher education contexts, where the study determined that 'attitude' was moderately correlated with 'perceived usefulness', weakly correlated with 'facilitating conditions' and 'ICT usage', and not correlated with 'perceived ease of use'. To draw more robust conclusions around potential causality between factors like attitude and other important variables that are important in educational contexts in relation to ICT, other research paradigms like quasi-experimental approaches or longitudinal approaches need to be applied.

Availability of Data and Materials

The datasets used and /or analysed during the current study are available from the corresponding author upon reasonable request.

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