



**Factors influencing English as a Foreign Language  
(EFL) teachers' use of Information and Communication  
Technology (ICT) in classroom practice: A mixed  
methods study at Hanoi University, Vietnam**

A thesis submitted in fulfilment of the requirements for the degree of  
Doctor of Philosophy

**Huong Thi Bao Dinh**

Bachelor of Arts (English linguistics) - Hanoi University, 2001

Master of Education (ICT in Education) - Monash University, 2007

School of Education

College of Design and Social Context

RMIT University

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## Declaration

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged and ethics procedures and guidelines have been followed.

Huong Thi Bao Dinh

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## List of abbreviations

ICT	Information and Communication Technology
EFL	English as a Foreign Language
MOET	Ministry of Education and Training
IT	Information Technology
VNPT	Vietnam Post and Telecom Group
WTO	World Trade Organisation
ASEAN	Association of the South East Asian Nations
BECTA	The British Educational Communications and Technology Agency
TPACK	Technological Pedagogical Content Knowledge
CK	Content Knowledge
PK	Pedagogical Knowledge
TK	Technological Knowledge
PCK	Pedagogical Content Knowledge
TCK	Technological Content Knowledge
TPK	Technological Pedagogical Knowledge
ASRT	Automatic Speech Recognition Technology
CMC	Computer-Mediated Communication
CALL	Computer-Assisted-Language-Learning
EDO	English Discovery Online
IELTS	International English Language Testing System
CHEAN	College Human Ethics Advisory Network
SPSS	Statistical Package for the Social Sciences Software
M	Mean score
SD	Standard Deviation
PCA	Principal Component Analysis
$\rho$	Spearman Rho

## Abstract

In recent times, ICT has been increasingly applied in education around the world. To understand the effectiveness of ICT integration, a vast body of research has focused on teacher use of ICT and factors influencing their use. However, most research to date has been conducted in Western countries, and little is known about EFL teachers in Vietnam.

This study was conducted at a university located in the capital of Vietnam, Hanoi University. It involved the EFL teachers from the English Department and Foundation Studies Department. The study employed a mixed methods approach, with a questionnaire being administered to 81 teachers, and semi-structured interviews being conducted with seven teachers. Data analysis was carried out using SPSS for questionnaire data and analytical coding for interview findings. This was done to answer three main research questions around teacher use of ICT, impact of the factors that influenced their use, including their TPACK, and the relationships between teacher demographic features and their use of ICT, their perceptions on the impact of the factors as well as their TPACK, from the perspective of the EFL teachers.

Drawing on a vast body of research around teacher use (including EFL teachers) of ICT and factors influencing their use (including TPACK), and two theoretical models, which were the Diffusion of Innovations Theory (Rogers, 2003) and the ecological perspective (Zhao & Frank, 2003), this study found that the EFL teachers used a mix of generic and language-specific ICT applications as tools for their classroom teaching. In this process, the teachers perceived that the influencing factors impacted to a varying degree, with the teacher being the most important factor. Teacher TPACK was found to have a positive correlation with their use of ICT. Some of the teacher demographic variables such as age, gender, main area of specialization, teaching experience and highest qualification also had positive correlations with their use of ICT, their perceptions on the impact of the factors and their TPACK.

The study has also suggested that teacher use of ICT is complex because different factors and groups of factors had complex relationships with teacher use of ICT. Also, there might be two simultaneous implementation stages of ICT by the teachers, namely compulsory and optional stages. As well, this study supported the ecological perspective that the factors might not be isolated, rather they might interact with one another in certain patterns.

Based on the main findings, a number of implications have been suggested in relation to policies, ICT-related guidelines at Hanoi University, professional learning, EFL teachers and future research.

**Keywords:** Information and Communication Technology (ICT), English as a Foreign Language (EFL) teachers, Technological Pedagogical Content Knowledge (TPACK), Statistical Package for the Social Sciences Software (SPSS), Hanoi University, Vietnam

## **Chapter One: Introduction**

This chapter provides an introduction to the study. It begins by exploring the influence of recent national policy developments around Information and Communication Technology (ICT) and English as a Foreign Language (EFL) teaching that foreground it, as well as the implementation at Hanoi University, the specific setting for this study. It then turns to consider key findings from the previous research around teacher use of ICT that frame it. It then describes the rationale for the study, the research questions and the significance of the study. Finally, there is an overview of the thesis organization.

### **1.1 Implementing ICT in higher education in Vietnam**

In recent times, ICT applications from Learning Management Systems to Web 2.0 technologies have increasingly been applied in higher education, so that their vital place is now secure (Jordan, 2011). The first wave of implementation was mainly in Western countries, such as Australia, the United States and the United Kingdom. In these countries, national and state policies reflect the belief that “learners using ICT will reap benefits to their learning, and that learners need ICT skills to be employed in the future high-tech workplace” (Jordan, 2011, p. 16). Implementation of ICT in Asian countries such as Vietnam, however, is relatively new.

Vietnam is a developing country where implementing ICT is often associated with the national reform agenda, and is often seen as an important tool in realizing a modern, global and technological society (Peeraer & Petegem, 2011). Education has been an area for major reform in Vietnam since the 2000s, with ICT always “high on the educational reform agenda” (Peeraer & Petegem, 2011, p. 974). In particular, ICT is seen as the means to support innovative teaching and learning (Peeraer & Petegem, 2011) in Vietnam, and is often seen “as a way to merge into a globalizing world” (Peeraer & Petegem, 2010, p. 1).

Beginning in 2006, the Vietnamese government released the Law on Information Technology Application, which stressed the importance of applying ICT in education. In 2008, the Ministry of Education and Training (MOET) released *Chỉ Thị (Directive) 55/2008-CT-BGDĐT*, which encouraged accelerating the application of ICT in education in general and in higher education in particular over the period 2008-2012.

This Directive is significant as it put in place a set of initiatives or “favourable conditions for ICT use in the national education system” (T. X. Dang, 2014, p. 8). In particular, it:

- declared the school year 2008-2009 as the ICT year in education,
- established the Department of ICT to implement ICT-related policies nationally,
- set out aims to provide free broadband Internet to all schools and continuous education centres, and free optic fibre Internet to all universities and colleges by mid-2009,
- recommended training for teachers at all levels via television, Internet and teleconferencing. It set goals to continuously train teachers in Information Technology (IT), and for each school in the national education system to have at least one IT technician and to have role-model teachers with adequate competence in using technologies in instruction,
- encouraged teachers to use Power Point presentation software, or e-lesson plans, to exchange ideas and experience via a forum on the MOET website, and to implement e-learning courses whenever possible,
- requested universities and colleges to each produce a website, and deploy the email system with the domain of @moet.edu.vn (*Directive 55/2008-CT-BGDĐT*, 2008, pp. 1-3).

Under this Directive, a number of sub-policies were also formulated with a focus on providing computers for teachers to use in their practice. One of these policies was the National Program launched by MOET in collaboration with Intel called “Academic Computers” to supply one million affordable computers to Vietnamese schools by 2011 (Microsoft Vietnam, 2009). Also in 2010, the Vietnam Post and Telecom Group (VNPT) in Ho Chi Minh city launched a local version of this program, which aimed at providing teachers and students in the city with “low-priced laptops and DSL broadband connection” (Vietnam Technology Report Q3, 2011, p. 5).

Later in 2010, Prime Minister Nguyen Tan Dung signed Quyết Định (Decision) 1755/QĐ-TTĐ, which approved the Target Plan to turn Vietnam into one of the world’s leading ICT nations. The Decision set ambitious targets to build the nation’s ICT capacity by the year 2020. One of these targets is that “by 2015, 30% of graduates from IT universities should be able to use foreign languages (mainly English) in their IT jobs. [This number] is expected to increase to 80% by the year 2020” (Decision 1755/QĐ-TTĐ, 2010, p. 2).

In 2011, Thông Báo (Announcement) 183/VĐ-VĐĐĐ was signed by the Deputy Prime Minister (formerly Minister of Education and Training) Nguyen Thien Nhan. It emphasised the importance of improving teaching methods and applying ICT in learning at all educational levels. It stipulated that “at least 50% of all teachers by 2015 will have their own computers for use in teaching and self-training, and that number is expected to increase to 100% by the year 2020 (Announcement 183/VĐ-VĐĐĐ, 2011, p. 2).

More recently in June 2014, Nghị Quyết (Resolution) 44/NĐ-ĐĐ was signed by Prime Minister Nguyen Tan Dung on comprehensive innovation in education and training to meet the industrialisation and modernisation demands of the country’s socialist-oriented economy in the global integration context. The Resolution emphasised the improvement

of resources and ICT applications in education and training. It stressed that “investment into education is investment for development, and modernisation of technical resources (in education), especially ICT resources is a crucial step to implementing an ultimate and comprehensive innovation in education and training” in the country (Resolution 44/NQ-CP, p. 5).

## **1.2 ICT implementation in EFL teaching in higher education in Vietnam**

### **1.2.1 English as a Foreign Language (EFL) in Vietnam**

As mentioned in the above section, Vietnam is a developing country that has been promoting ICT as a tool for socio-economic development in the global integration context. This section provides details on Vietnam’s history of rule by various colonial powers and the recent move to globalisation through membership of the World Trade Organisation (WTO), resulting in the need to teach EFL at universities. A brief history of Vietnam will be helpful in understanding the dominant position of the EFL in the existing national education system, because “Vietnam’s linguistic history reflects its political history” (Denham, 1992, p. 61). The section that follows will detail Vietnam’s efforts in implementing ICT in EFL instruction in higher education to set the broad context for this study.

Vietnam has a 4000-year history, most of which was under foreign domination, with different languages dominating at different times. For nearly 1000 years under Chinese domination (Denham, 1992), Chinese language (Han writing characters) with its Confucian legacies was dominant in the national education and examination system (Do, 2006; London, 2011). In the 17th century, a Latin-based writing system for the Vietnamese language was developed by missionaries, Alexandre de Rhodes specifically, which was called Chu Quoc Ngu (Do, 2006). However, under French colonial rule in the 19th century, French was the official language in the education system while ordinary



citizens were still using Vietnamese. In 1945 after gaining independence from France, the Vietnamese language with Chu Quoc Ngu was made official for all Vietnamese people (Le, 2011).

After the Geneva Treaty in 1954, Vietnam was divided into two parts: the North and the South, each with “its own political directions” (Do, 2006, p. 3). In the North, Vietnamese was the official language. Because Russia and China were North Vietnam’s allies in the Vietnam War, Russian and Chinese became dominant foreign languages in the North. At the same time, English was a very popular foreign language in South Vietnam because of the strong connection with the United States.

Since the country’s unification in 1975, Vietnamese has been used as the official language in all aspects of life in the country. During the period 1975-1985, Russian was the most dominant foreign language in Vietnam because of the country’s alliance with Russia (Do, 2006). Also during this period, the economy faced a number of difficulties, due partly to economic management issues and to the US economic embargo against Vietnam. In 1986, the country’s ruling Communist Party started its *doi moi* (innovation) policies (Napier & Nguyen, 2003), which indicated Vietnam’s willingness to be friends with all countries in the world. In other words, the policies showed Vietnam’s strong aspirations to establish cooperation with all countries, including the West (Pham, 2011).

The policies have brought about dramatic changes in the economy and diplomatic relationships of Vietnam. In the period 1990-2000, the country achieved a GDP growth rate of 7.5% per annum (Báo Điện tử Đảng Cộng sản Việt nam-The Vietnamese Communist Party’s Electronic Newspaper, 2006). In 1994, the US economic embargo against Vietnam was lifted (The Independent, 1994), paving the way for normalising the relationship between the two countries in 1995. Also in 1995, Vietnam became the official 7th member of the Association of South East Asian Nations (ASEAN). In January

2007, Vietnam became a member of the World Trade Organisation (WTO, 2007), marking its official entry into the global economy.

Because of the collapse of the Soviet Union in 1989 (Napier & Nguyen, 2003), Russian was no longer the dominant foreign language in Vietnam. Instead, together with its dramatic political and socio-economic developments thanks to its *doi moi* policies, Vietnam has witnessed a big leap in the status of EFL. As Do (2006, p. 8) pointed out “English has developed with an unprecedented speed in Vietnam” because “the Vietnamese see English as the key which opens many doors” (Denham, 1992, p. 64). As a result, English is now the most popular foreign language chosen by “at least 90% of learners” in Vietnam (Do, 2006, p. 8), including students at universities. From 1997, it is required that university students sit a foreign language (mainly English) test for graduation exams (Do, 2006).

To reiterate, English is the most popular foreign language in Vietnam because it is seen as a means of integrating into the global economy (Truong, 2013). Also, ICT is seen as a tool for socio-economic development in Vietnam in the globalisation process. As a result, the government of Vietnam has been formulating policies to apply ICT in English teaching and learning at all levels of the national education system, including higher education, which is discussed in the next section.

### **1.2.2 ICT implementation in EFL teaching in higher education in Vietnam**

National policy efforts to implement ICT in English language teaching in higher education became one of the foci in Quyết Định (Decision) No 1400/QĐ-TTĐ/2008 signed by Prime Minister Nguyen Tan Dung in November 2008. This policy, the National Project on Foreign Language Training, emphasised the application of ICT in the teaching and learning of the English language. Included in the Project Plan was a list of actions that focused on “more investment into technological infrastructure for the teaching and

learning of foreign languages” (Decision No 1400/QD-TTG/2008, p. 5), which involved building multi-media language labs for participating universities. The Plan also indicated that to make the most of ICT in language teaching, professional development on how to use ICT equipment should be considered (Decision No 1400/QD-TTG/2008).

The National Project on Foreign Language Training, normally referred to as the 2020 Project, attracted huge financial investment from the government. The total budget allocated for the first period (2008-2010) was 1,060 billion VND (approximately 54.3 million AUD), for the second period (2011-2015) it was 4,370 billion VND (roughly 224.5 million AUD) and for the last period (2016- 2020) it will be 4,300 billion VND (about 220.5 million AUD) (Decision No 1400/QD-TTG/2008).

Under the 2020 Project, a framework for ICT Competence Standards to be used by EFL teachers was drafted at the end of 2013 (Bộ Giáo dục và Đào tạo-MOET, 2013). This framework outlined four standards that should be achieved by EFL teachers in relation to ICT. The first standard required (EFL) teachers to “have basic knowledge and skills to use ICT that are in line with their career goals” (p. 49). The second was that EFL teachers need to “combine pedagogical knowledge and technical knowledge to improve foreign language teaching and learning” (p. 51). The third was that teachers need to have “capacity to apply technology to store, to give feedback and to evaluate learning outcomes” (p. 54). The last goal was that “teachers should be able to use ICT to improve communication, cooperation and teaching efficiency” (p. 57).

### **1.3 ICT use in EFL teaching at Hanoi University, the research setting**

The research setting for this study is Hanoi University, one of the biggest state-run universities in Vietnam’s capital city, Hanoi. The university’s training focus has always been on foreign languages, especially on EFL. Graduates from the university’s English Department could become interpreters, translators or teachers of English for universities

and schools in the country. More recently, the university has offered a number of courses in Tourism, Business Administration, Accounting, International Studies and Information Technology through the medium of English. The Foundation Studies Department prepares first-year students in English language so that they can study those courses in English from their second year onward.

Hanoi University is one of the eight universities that have been involved in the National Foreign Language Training Project (Đại học Hà nội-Hanoi University, 2013), as described above. Through such projects, the university has been investing in technological infrastructure. To date, Hanoi University has 15 Internet-connected computer labs and 18 language labs, which house nearly 1,000 desktop computers. There are about 45 projectors (T. X. Dang, 2012), one Student Access Centre and one Conference room (Thư viện Đại học Hà nội-Hanoi University Library Centre Profile, 2011). In addition, the University has purchased some English language software packages such as *English Discovery* and *English Discovery Online* for use in EFL instruction (Pham, Thalathoti, Dakich, & Dang, 2012).

The reason for choosing Hanoi University as the research site for this study is my direct involvement with the university. For eight years as an EFL teacher at the university, I had chances to use ICT in my classroom instruction. During this process, I came to realise that a number of factors affected my ICT use. I was required by the English Department through the teaching timetable to teach English using the software *English Discovery Online* for first-year English majors. I struggled because I did not know where to start, how to integrate ICT with the content in my lessons, or how to relate the content to instructional goals. Reflecting on the experience, I initially thought that it was because of my limited knowledge and skills in teaching English using technology. Later, I recognised that the university was focusing on investing in the technology,

without the same level of attention being given to teacher preparation for teaching with technology. My experience shows that using ICT is not so simple, and that if we are “over-optimistic ... that technology should be able to do everything ...” (Bax, 2003, p. 26), without proper planning, it is very hard for teachers to use ICT in their practice.

#### **1.4 Previous research studies on ICT use**

Current research on ICT use in education (schools and higher education) has highlighted some major issues. First, research has raised the issue of a lack of clarity in numerous national policy efforts to implement ICT in education. For example, Groff and Mouza (2008) emphasized that in general, “concrete recommendations on how to achieve the goals [set in policies] are rarely included in policy reports, thereby making it difficult to draw any practical implications” (p. 25). Another researcher puts it this way, that in this process, administrators and policy makers have often been trapped into “wishful thinking” and “behave as though their desire concerning what a school system should accomplish will in fact be accomplished if the policy makers simply decree it” (Wise, 1977, p. 45, cited in Fullan, 2001, p. 98). Similarly for Vietnam, Peeraer and Tran (n.d) in their review of policies formulated by the Vietnamese government for ICT in 2008, commented that while there have been a number of ambitious targets and standards, there are few “concrete ideas concerning effective integration of ICT in teaching practice and pedagogic and curricular change” (p. 7).

Second, there is research from many countries that indicates that teacher uptake of ICT is slow (Cuban, 2001; Groff & Mouza, 2008; Nguyen & Le, 2012), even though there have been vast sums of money spent on putting ICT into place. For the most part, rather than using ICT to adopt innovative practice, research has shown that teachers tend to use ICT “to make their current jobs quicker and easier” (Jordan, 2011, p. 16). There is also recognition that the field is perhaps under-theorised and not enough attention has been

paid to the complexities, rather they have been under-estimated (Mishra & Koehler, 2006). There are still a large number of debates and areas of conflict to be resolved around the use of ICT in school and higher education.

However, what research has agreed on is that ICT use by teachers in classroom instruction is not simple, and that a large number of factors come into play, and that this is often highly contextual and not always predictable (Groff & Mouza, 2008; Hew & Brush, 2007; Mumtaz, 2000; Park & Son, 2009; The British Educational Communications and Technology Agency - BECTA, 2004; Yildiz, 2007; Zhao & Frank, 2003; Zhao, Pugh, Sheldon, & Byers, 2002). Also, there is a general consensus that a number of the most commonly cited factors include teachers' knowledge and skills, technical resources, curriculum, access to technology, leadership and professional development.

As part of the increasing awareness about the complexity around teacher use of ICT is the criticism of the distinction between the generation of "digital natives" versus the generation of "digital immigrants", and the resulting "immigrant/native divide" by Prensky (2001, p. 4). This perspective suggests that there is a gap in technology skills between the generation referred to as the digital natives who were born after 1980, "one which has grown up with ICT as an integral part of their everyday lives" (Bennett, Maton, & Kervin, 2008, p. 775), and those who were born before 1980, the digital immigrants (Bennett et al., 2008; Prensky, 2001).

Prensky's (2001) perspective seems to offer a simplistic view, which considers age "as a defining factor" (Helsper & Eynon, 2009, p. 505) in people's use of technology, including teachers. As such, this perspective is often criticised for "ignor[ing] the complexity and diversity in use of ... technology" (Helsper & Eynon, 2009, p. 505), because other factors might come into play, as discussed above.

Research has also shown that teachers' knowledge and skills might be an influencing factor in their use of ICT (BECTA, 2004; Groff & Mouza, 2008). This teacher knowledge and skills was conceptualised by the Technological Pedagogical Content Knowledge (TPACK) by Mishra and Koehler (2006). This framework was built on Shulman's (1986) notion that Content Knowledge (what to teach) and Pedagogical Knowledge (how to teach) interconnect, and in doing so, form a new knowledge peculiar to teachers, termed Pedagogical Content Knowledge. Mishra and Koehler (2006) argue that Technological Knowledge needs to be added to this framework because of the influence that it is having on education. They, therefore, proposed a framework in which there are three main knowledge domains (Content Knowledge-CK, Pedagogy Knowledge-PK and Technological Knowledge-TK), as well as "three intersecting pairs of knowledge (Pedagogical Content Knowledge-PCK, Technological Content Knowledge-TCK, and Technological Pedagogical Knowledge-TPK) and one triad, Technological Pedagogical Content Knowledge (TPACK)" (Jordan & Dinh, 2012, p. 319). Later versions of the TPACK framework have added the function of Context, as represented by a circle that envelopes the other domains (Jordan & Dinh, 2012).

The Diffusion of Innovations Theory (Rogers, 2003) and ecological perspective (Zhao & Frank, 2003) are two influential models that could offer a theoretical perspective on teachers' decision-making in relation to their use of ICT, as well as how the factors that influence this decision-making operate and relate. These factors also include teachers' TPACK.

While there has been a large amount of research involving ICT use and factors influencing teachers' ICT use, most of it has been conducted in developed countries. Given the importance of context, as identified by numerous researchers including Mishra and Koehler (2006) above, findings are not likely to be transferrable to other contexts,

such as Vietnam. At Hanoi University there has not been much research, although it seems to be increasing, given the support provided to teachers such as myself to undertake research degrees overseas. Research that has been conducted has focused on identifying the factors that influence teachers' use of ICT, such as teachers' knowledge and skills, technical resources, curriculum, access to technology, leadership and professional development as mentioned above, or on classifying these factors into groups such as enablers and barriers (T. X. Dang, 2012; T. X. Dang, 2014; Dang, Nicholas, & Lewis, 2012; Dinh, 2009; Vu, 2005). Little research has explored teachers' perspectives on the impact of particular factors on their use of ICT in classroom practice, including their TPACK, or the relationship between teachers' demographic features such as gender, age, teaching experience, main area of specialization and highest qualification and their ICT use in classroom practice.

### **1.5 Rationale for the study**

This study was conducted to:

- 1) Investigate the possible impact of factors influencing EFL teachers' attempts to use ICT in the classroom;
- 2) Consider the possible role of teachers' demographic features in their ICT implementation; and
- 3) Add to the body of research on ICT use in a developing country, namely Vietnam.

### **1.6 Research questions**

This research study at Hanoi University was guided by the following research questions:

In relation to the EFL teachers' perspectives:

1. Which ICT applications do they use in their classroom practice?



2. What is the impact of particular factors on their use of ICT in their classroom practice, including teachers' TPACK?
3. What is the relationship between their age, gender, teaching experience (years and specialization) and qualifications and
  - a. ICT applications used in classroom practice
  - b. factors influencing ICT use, including teachers' TPACK.

### **1.7 Significance of the study**

The study is important for a number of reasons. It contributes to the broad field of research around teacher use of ICT in their practice. As this field of research has mainly been conducted in Western countries, this study from within a Vietnamese university context provides a different lens. Because the factors affecting teachers' use of ICT in their classroom practice tend to be "culture-based and discourse-oriented" (Nguyen & Le, 2012, p. 164), it is expected that a Vietnamese teacher teaching EFL at a university brings with him/her some different Vietnamese cultural characteristics, set within a university functioning in a developing country, which is trying to develop its economy through ICT application in education. In addition, by participating in this study, it is hoped that the EFL teacher participants might gain a better understanding of their current practice, and as a result may continue to reflect on and further develop their practice.

Also, this study could help inform the further implementation of ICT in the two EFL departments at Hanoi University: English Department and Foundation Studies Department. Specifically, it could provide administrators with a better understanding of the factors that influence teacher decision-making, such as, which factors have the most influence and, therefore, assist them to develop detailed strategies and guidance. The university could also provide support and professional development relevant to the EFL

teachers' needs based on the main findings of this study. As pointed out in previous sections of this chapter, Vietnamese ICT-related policies have tended to lack clarity around how to best support teachers to meet stated objectives and targets. Thus, this study could assist policy-makers as they continue to implement ICT in higher education in Vietnam.

## **1.8 Thesis organization**

This thesis consists of six chapters and 13 appendices.

Chapter One introduces the study, situating it within the larger field of research around the use of ICT in teacher practice and gives the reader some detail about the particular context at Hanoi University, Vietnam. It also provides the rationale for the study, including my interest in pursuing the study, as well as the research questions, and the significance of the research. Finally, it provides an outline of the organization of this thesis.

Chapter Two reviews the research literature that informs this study. It has two main parts. The first part reviews ICT applications commonly employed by EFL teachers in their classroom teaching. The second part discusses previous attempts to identify and categorise factors that influence teachers' use of ICT in classroom practice. It also highlights some of the issues in this area of research. Also, this part explores research around teacher knowledge in relation to using ICT in classroom practice, referred to as the TPACK framework. It then moves on to investigate two influential models, namely the Diffusion of Innovations Theory (Rogers, 2003) and the ecological perspective (Zhao & Frank, 2003), which could offer a lens to look at factors influencing teachers' use of ICT and how these factors operate and relate. Using these two models as an organizing framework, this part of the chapter reviews factors peculiarly influencing EFL teachers'

use of ICT in classroom teaching, and finally provides a summary representation of these factors in a diagram.

Chapter Three describes the research methodology of this study. It is divided into three main parts. The first part explores the research questions, the researcher's pragmatic world-view and the decision to select a mixed methods approach as a blueprint for the study. The second part describes the research setting and participants. In the last part, the data collection and analysis are described. This includes data collecting instruments such as a questionnaire and semi-structured interviews, as well as data analysis methods including descriptive statistics, correlational statistics, exploratory factor analysis for questionnaire data and analytical coding for interview data. This is followed by a discussion on reliability and validity in data collection and analysis, and ethical considerations which concludes this chapter.

Chapter Four reports the findings of the study in response to the research questions presented in Chapter One. In doing so, it reports the findings from the questionnaire separately from the findings from the interviews to answer research questions one and two around ICT applications and the impact of factors on teacher use of ICT, including their TPACK. The last part, drawing mainly on the questionnaire data, reports the findings around the relationship between EFL teachers' demographic features such as age, gender, year of teaching experience, main area of specialization, highest qualification and teacher use of ICT, their perceptions on the factors influencing their use of ICT and teacher TPACK.

Chapter Five discusses the integrated results of the study obtained from the questionnaire and interviews in relation to the research literature, using the research questions as an organizing framework. The chapter first discusses the integrated findings around ICT applications, and the impact of factors on teacher use of ICT, including their

TPACK. The chapter also discusses findings around the relationships between teachers' demographic features such as age, gender, year of teaching experience, main area of specialization, highest qualification and teacher use of ICT, their perceptions on the factors influencing their use of ICT and teacher TPACK. Findings discussed in this respect mainly come from the questionnaire. In the last part, the chapter discusses the complexity in teacher use of ICT, based on findings from both questionnaire and interviews.

Chapter Six concludes the study in relation to the research questions presented in Chapter One, as well as discussing the implications and limitations of the study.

### **1.9 Chapter summary**

This chapter has introduced the reader to this study. It has described the broad ICT and EFL policy context that informs it, as well as the specific context at Hanoi University, where this research is set. It has also reported on the research questions and the significance of the study. Finally, it has outlined the organization of the thesis.

## **Chapter Two: Literature Review**

This chapter reviews literature relevant to this study and is divided into two main parts.

The first part reviews literature around ICT applications commonly used by EFL teachers in school education and higher education contexts. The second part turns to consider research around factors that impact on teachers' use of ICT, in particular their TPACK (Mishra & Koehler, 2006). It also considers two theoretical frameworks, Rogers' (2003) Theory on Diffusion of Innovations, and Zhao and Frank's (2003) ecological model because they provide a perspective on how the factors operate and relate. This part also reviews literature around factors that are peculiar to EFL teachers and it does so in relation to these two theoretical frameworks. The second part of the chapter concludes with a summary representation of factors that influence teacher adoption of ICT.

### **2.1 ICT applications used by EFL teachers**

The first part of this chapter reviews research around ICT applications commonly used by EFL teachers in classroom teaching. It draws on research from both school contexts and higher education contexts. While the focus of this study is on higher education, much of the literature has been concerned with school education, and as such can inform this study. It should also be noted that some research does not clearly separate these two contexts.

In this review, I adopt a "modular approach" (Levy, 2009, p. 769), which involves categorising ICT applications according to typical EFL instructional purposes, such as developing students' knowledge and skills for grammar, vocabulary and pronunciation, reading, writing, speaking, listening, and cultural understanding. This modular approach is consistent with practices used by the EFL teachers in the English Department and Foundation Studies Department at Hanoi University, who were the participants in this study (see Section 3.2.2, Chapter Three).

### **2.1.1 ICT applications for grammar, vocabulary and pronunciation**

The use of ICT for grammar and vocabulary has been one of the “traditional” foci of ICT use in EFL teaching. Most of these applications use a skill and drill approach, which aims to “process learner input, diagnose errors and provide feedback” (Levy, 2009, p. 770). One of the typical programs of this type is *Hot Potatoes* (Levy, 2009; Stockwell, 2007), which includes “six straightforward tutorial activities for vocabulary and grammar learning ... conceptualised around the word and sentence” (Levy, 2009, p. 771).

In relation to developing pronunciation, word recognition applications often employ computer-based applications (Chen, 2011). With these types of applications, students normally listen to a model speech given by native speakers, and then practise the pronunciation themselves. Their practice is recorded and then compared to models using visual and audio feedback (Godwin-Jones, 2009). Some popular computer-based applications are *Caroline in the City/CNN Interactive English* (Hebron Soft), *Syracuse English Comprehensive Learning Series* (Syracuse Language), *Tell Me More Pro* (Auralog), *TRACI Talk* (CPI), and *Encarta Interactive English Learning* (Microsoft) (Chen, 2001). Research suggests that these applications could motivate learners to practise their pronunciation by producing sentences, by receiving feedback for correction and by following models of native-speakers provided in a more relaxing learning manner (Chen, 2001).

More recently, a number of web-based applications have been produced using Automatic Speech Recognition Technology (ASRT). These applications have been reported to be particularly effective for EFL learners, “who are shy, who are afraid of face losing or who rarely have chances to speak with native speakers” (Chiu, Liou, & Yeh, 2007, p. 210). The applications range from tailor-made web-based conversation environments such as *My English Tutor*, *Candle Talk* (Chen, 2011; Chiu et al., 2007),

*Parling* (Neri, Mich, Gerosa, & Giuliani, 2008) to readily available applications such as the *Microsoft Speech Application Software Development Kit- SASDK* (Chen, 2011). Researchers suggest that by providing a variety of exercises, these applications have “encouraged learners to produce more output in a low-anxiety environment” (Chen, 2011, p. 59).

### **2.1.2 ICT applications for four language skills**

A number of ICT applications are also employed by the EFL teachers to develop learners’ language skills such as reading, writing, speaking and listening. To begin with, the major applications for reading are “electronic dictionaries and ... web-based activities that seek to teach a variety of components (from text structures and discourse organisation to reading strategies), and the Internet as a source of materials for extensive reading” (Chun, 2006, p. 69, cited in Levy, 2009, p. 772). Levy (2009) argues that these technologies are used to assist “the reader with further information or exemplification or provide practice and exposure to extended texts” (p. 772).

Empirical research has shown that electronic dictionaries are favoured by EFL teachers for their ease of use, usefulness and speed (Issa & Jamil, 2012) and by EFL students because they help students decrease reading comprehension time (Koyama & Takeuchi, 2007) and learn vocabulary more effectively through etymological analysis (Fageeh, 2014). Similarly, web-based activities for reading such as the use of hypertext, hypermedia, glosses and annotations in authentic texts, are valued for their “usefulness ... to present information as well as the interaction between the reader and the text” (Ercetin, 2003, p. 275). It is suggested in research that by using these applications, EFL learners can “have more control of their reading” (Ercetin, 2003, p. 275), through which they can “develop language literacy skills and intercultural understanding by reading authentic texts on the Internet” (Abraham, 2008, p. 199).

As far as writing is concerned, the most popular ICT application is Word-processor (Levy, 2009), which with “its central function-to facilitate the flexible manipulation of text-enables drafting and redrafting to occur easily, and the eventual product may be presented to a professional standard” (Levy, 2009, p. 772). Additionally, the use of the track changes function could be considered as a way of providing timely feedback and correction to EFL learners’ writing tasks (Levy, 2009). Moreover, when learners use the track changes function to provide peer feedback, this could lead to “greater revision and more effective writing” (Murray, 2008, p. 24).

Finally with regard to speaking and listening skills, popular ICT applications are Power Point presentation software (Alkash & Al-Dersi, 2013), digitized audio-video (Levy, 2009), and Computer-Mediated Communication (CMC) technologies such as voice chat and audio/video conferencing (Stockwell, 2007). Power Point presentation software, which is “a common oral report style... which requires logical and analytical organization and accuracy of facts and wording” (Yen & Yang, 2013, p. 117) embedded with audio-video clips (Alkash & Al-Dersi, 2013), is increasingly applied in EFL instruction. It is valued because advocates argue that it makes it easier and more interesting for teachers to present instruction and for students to present their work, it engages learners in a more interactive language environment and creates more motivation for learners to learn English (Alkash & Al-Dersi, 2013). In addition, digitized audio and video are readily available on the Internet, so teachers can easily download or store the files for use in teaching listening skills for learners (Levy, 2009). Finally, voice chat and audio/video conferencing might be beneficial for learners to develop their speaking skills (Levy, 2009; Stockwell, 2007) by improving learners’ “pragmatic competence in the target language” (Murray, 2008, p. 25). In using voice chat, learners can record an oral message and check it before exchanging it with their peers or their teachers. This helps



learners focus on both “form and meaning” (Murray, 2008, p. 25). Different from voice chat, when learners engage in audio/video conferencing, the message exchanged is sent at the same time (Stockwell, 2007). These messages can, therefore, help learners develop “fluency” (Murray, 2008, p. 25) for their speaking skills.

### **2.1.3 ICT applications for cultural understanding**

The most popular way to develop learners’ cultural understanding is by exposing them to authentic materials on the Internet. Another way is to engage learners in web-based activities/projects that employ different functions of a web page such as “tele-collaboration, intercultural exchanges or key-pal projects ... which feature email, chat, discussion forum, etc ...” (Levy, 2009, p. 776) where “internationally dispersed students of languages ... use Internet tools to support social as well as academic interaction and intercultural exchange” (Belz, 2004, p. 578, cited in Helm, 2009, p. 91). The assumptions often underlying these projects are that there is a close link between language and culture, and by engaging in these projects, learners can develop their understanding of the culture of the target language country (Helm, 2009).

As the review has shown so far, a number of ICT applications are routinely employed by EFL teachers in their classroom teaching, and much of this has reported positive results on students’ learning. Research has also reported that EFL teachers tended to use ICT applications as an aid to their classroom instruction. This is discussed in further detail below.

### **2.1.4 EFL teachers’ use of ICT**

Most previous research on EFL teachers’ use of ICT suggests the prevalence of the use of common ICT applications as an aid to support their classroom instruction. For example, Hassanzadeh, Gholami, Allahyar and Noordin (2012) in their research in Malaysia suggested that EFL teachers used general software applications in their practice such as

“Internet, email, presentation, word processing and office work” (p. 81). Similarly, in Park and Son’s (2009) study in Korea, teachers “preferred to use Word Processor, Power Point, the Internet and CD-ROMs in the classroom as teaching tools” (p. 96). Likewise in China, the most commonly used application by teachers in their classroom teaching is Power Point presentation software for displaying information (Keengwe & Kang, 2013; Li & Ni, 2011), followed by other applications such as word-processing, Internet browsing and emailing (Li & Ni, 2011). Yet, this use of ICT by the EFL teachers focused on either “grammar and language form” (Li & Walsh, 2011, p. 109) or “grammar-translation method” (Keengwe & Kang, 2013, p. 614) with teachers “directing and managing students’ activities resulting in limited teacher-student interactions” (Keengwe & Kang, 2013, p. 614). Furthermore, Murray (2008, p. 24) stated that ICT applications such as word processor, Power Point, email and the Internet are often used as tools “that help learners organise ... facilitate communication and provide information”. Similarly, Kim (2008) found that the EFL teachers in her study employed ICT as a tool for resources, for tutoring, for communication, for presentation, and for writing skills. However, their use of technologies is similar to the model of using ICT for “practice and drill purposes”. These EFL teachers thus adopt an approach that is in line with a teacher-centred approach; as a result, ICT is used as a supplementary tool to their instruction.

Research, however, has suggested that in order to have an impact on students’ learning, the teachers should use ICT following a constructivist teaching approach, or a more student-centred approach, because this provides students with opportunities to construct their knowledge by doing (Carr, 2013; Kim, 2008; Koehler, Mishra, & Yahya, 2007; Murray, 2008; Wang, 2002). Indeed, some researchers argue that when constructivist teaching approaches are used, teachers’ use of ICT such as Internet for teaching English increases (Boulter, 2007). In turn, the more teachers use the Internet for

teaching, the more likely it is that they will adopt innovations for their teaching process (Chen, 2008b).

The literature reviewed in this part has suggested that EFL teachers tend to use ICT as a tool to support their instructional purposes including teaching of grammar, vocabulary, pronunciation, reading, writing, speaking, listening and cultural understanding. The next part of this chapter turns to consider the complexity in teacher use of ICT. It focuses on a considerable body of research, which has investigated and categorised various factors that can impact on teacher use of ICT, including their TPACK.

## **2.2 Factors influencing teacher use of ICT**

Over a considerable period of time, researchers have been interested in identifying factors that impact on teacher decision-making. This research developed by a number of different researchers, and in different educational contexts (including the Vietnamese context), has had different foci. Often this research focused on identifying and categorising factors as either barriers or enablers or in other ways and this research is the focus of this review. More recently, research has focused on exploring the influence of teacher's knowledge on teacher use of ICT, including the development of the influential TPACK framework (Mishra & Koehler, 2006).

### **2.2.1 Previous attempts to categorise factors influencing teachers' use of ICT**

This section provides details on previous research attempts to identify and categorise factors influencing teachers' use of ICT. It is divided into three main subsections focusing on attempts to identify barriers, attempts to identify enablers and attempts to categorise the factors in other ways.

### ***2.2.1.1 Attempts to identify barriers***

Over time, researchers have been attempting to identify the barriers influencing teachers' use of ICT in their classroom practice. Most of the research has categorised the barriers according to their own research agenda. These research attempts are detailed below.

#### **Ertmer, Addison, Lane, Ross and Woods (1999)**

One of the first attempts to identify and categorise factors influencing teachers' use of ICT is that of Ertmer, Addison, Lane, Ross and Woods (1999). These researchers focused solely on the barriers affecting teachers' use of ICT in elementary classrooms in the United States. Ertmer et al. (1999) classified the barriers into "first-order" and "second-order barriers" (p. 54), and studied the relationship between these barriers. In these researchers' perspectives, the first-order barriers to ICT use were those "extrinsic to teachers and include a lack of access to computers and software, insufficient time to plan instruction, and inadequate technical and administrative support" (Ertmer et al., 1999, p. 54). In contrast, second-order barriers were "intrinsic to teachers and include beliefs about teaching, beliefs about computers, established classroom practice, and unwillingness to change" (Ertmer et al., 1999, p. 54). The researchers suggested that often, the teacher played a more important role because although teachers might experience the same first-order barriers such as a lack of resources and a lack of time, these barriers might not affect their use of ICT in the same manner, what came into play were teachers' beliefs, which were the second-order barriers. Other first-order barriers such as classroom organization appeared to have an impact on teachers' use of technology, but the level of impact depended on how teachers used technology, either to "support... or... supplement the curriculum" (p. 67). In doing so, Ertmer et al. (1999) suggested that there was a complex relationship among both the first-order and second-order barriers.

### **The British Educational Communications and Technology Agency-BECTA (2004)**

In another attempt to identify and categorise barriers, the British Educational Communications and Technology Agency-(BECTA) (2004) focused on the inhibiting factors to teachers' use of ICT in schools in the United States, United Kingdom, Australia and Canada. In both reviewing the literature and conducting its own research study on the barriers, BECTA (2004) argued that there were complex relationships among barriers, and that a number of barriers must be broken down into different "sub-barriers" (p. 11). For example, BECTA (2004) broke down some barriers, namely "a lack of access to resources" (p. 12) into sub-barriers such as "a lack of hardware, poor organization of resources, poor quality hardware, inappropriate software and lack of personal access by teachers" (p. 14). BECTA also argued that a number of barriers perceived by teachers were actually the "symptoms of other barriers" (p. 17). For example, such barriers as teachers' perceived resistance to change was the reflection of other barriers, namely the type of equipment and training teachers had access to. BECTA (2004) also classified the inhibiting factors into different levels such as institution-level and teacher-level. BECTA (2004) pointed out some of the main factors inhibiting teachers' use of technology at school level, a "lack of time, lack of access to resources, lack of effective training and technical problems" (p. 20). Some teacher-related factors were "lack of time, lack of confidence, resistance to change and negative attitudes, no perceptions of benefits and lack of access to resources – home or personal" (p. 20). Finally, BECTA (2004) drew upon the interconnections between some of the main barriers at the teacher-level and institution-level. For example, "a lack of teacher confidence" was the consequence of a combination of "a lack of personal access" at school and at home, "technical problems (lack of technical support)" and "fear of things going wrong", and "a lack of teacher competence", which might be affected by "a lack of skill training, self-training and

pedagogical training” (BECTA, 2004, p. 21). Meanwhile, “a lack of hardware”, “poor quality hardware” and “inappropriate software use” resulted in “a lack of access” (BECTA, 2004, p. 22).

To summarize, BECTA (2004) stated that the barriers pertaining to teachers were more difficult to address than those related to the institution. BECTA, therefore, stressed the importance of giving teachers enough support and guidance, so that the teachers themselves could overcome the teachers-related barriers and thus ensure they kept up with changes in implementing technologies in schools.

#### **Hew and Brush (2007)**

Similarly, Hew and Brush (2007) focused on categorising the inhibiting factors into six groups: “resources, institution, subject culture, attitudes and beliefs, knowledge and skills and assessment” (p. 223) when reviewing research on school contexts mainly in the United States. Following this classification, Hew and Brush (2007) stated that a lack of resources encompassed a lack of “technology, access, time... and technical support” (p. 226). In this group, the barriers related to technology, access and technical support seemed to come from the institution, while time was more related to the teachers – whether or not they had time to use technology into their classroom practice.

Hew and Brush (2007) also argued that if not supported and well-planned by institutional leaders, technological use could not be diffused widely at the institution. Besides, they argued that the teachers’ use of technology in their practice largely depended on whether they believed technologies could help them to achieve instructional goals. Thus, Hew and Brush (2007) emphasized the role of teachers’ beliefs in technologies as influencing teacher use of technology in classroom teaching. Hew and Brush (2007) also tried to establish the relationship among these barriers. For example, the institution may have an influence on resource provision and teachers’ knowledge and

skills through professional development. Teachers' knowledge and skills in turn might affect their attitudes and beliefs toward technology usage.

**Yildiz (2007)**

In a similar vein, drawing upon research on ICT use in school contexts in both developed and developing countries, Yildiz (2007) classified the barriers into three main groups: physical factors, educational factors and philosophical factors. In Yildiz's (2007) view, a lack of hardware, software, resources for infrastructure and slow and unstable Internet connection were counted as physical barriers. Teacher resistance to technology and their doubts about the benefits of technology to their classroom practice were classified as educational factors. Overcrowded classrooms, an inflexible curriculum and a lack of institutional support could also be considered as educational factors. Philosophical factors mainly related to assumptions held by governments and administrators that investing huge amounts of money in the latest technology can bring about "immediate better education" (Yildiz, 2007, p. 151). As well, these factors were interrelated because the "total cost of ownership of computer technology in an educational institution goes beyond the purchase cost of hardware" (Yildiz, 2007, p. 148). This is because when the computers are put in place, "... additional funding is required for planning, training, maintenance, support and upgrading, recruiting technology-support personnel, and providing opportunities for training and professional development" (Yildiz, 2007, p. 148). It is important to understand this, as failing to do so "often leads to obsolete technology, frustrated teachers and failure to achieve the desired results" (Yildiz, 2007, p. 148).

**Groff and Mouza (2008)**

Meanwhile, Groff and Mouza (2008, p. 35) represented inhibiting factors drawn from research in school contexts mainly in the United States in four broad categories: "the Context [School], the Innovator [Teacher], the Innovation [Project], and the Operator

[Student]”. They chose to focus on these inhibiting factors because, in their opinion, these factors could be “directly addressed by the teacher” (Groff & Mouza, 2008, p. 23). In terms of the Context, they argued that a lack of administrative, advocacy and professional training could impede teachers’ technology use. Groff and Mouza (2008) also placed peer support under the Context category. With regards to the Innovator, their lack of technical knowledge and skills, and of “support resources” (Groff & Mouza, 2008, p. 31) as well as negative attitudes and beliefs toward technologies appeared to be big barriers to their implementation of technology-based projects. In terms of the Innovation itself, the more alien the innovation was to the existing culture of the school and the more largely it depended on factors that were beyond teachers’ control, the less likely that it would be successfully implemented. Finally, in relation to the Operator, the barriers facing the student were similar to those facing the teacher. These included students’ lack of experience and skills with working with technologies, and negative attitude and beliefs toward technologies.

**Park and Son (2009)**

Specifically in terms of factors influencing EFL teachers’ uptake of computers in the classroom, Park and Son (2009, p. 83) classified the barriers as “external factors” and “internal factors” by drawing upon research in school contexts in Korea. In their view, external factors were those that can be associated with the school context. They came up with a long list of external barriers such as “limited time, insufficient computer facilities at school, inflexibility of curriculum and textbooks, lack of administrative support from the school or the government and pressure from the society...” (p. 97). The internal (or teacher-related) impeding factors included teachers’ “limited computer skills and knowledge about Computer-Assisted-Language-Learning (CALL) and their perceptions



and attitude towards CALL” (p. 97). In many ways, this representation was similar to the one by BECTA (2004).

This section has reviewed previous research attempts to represent barriers to teachers’ (including EFL teachers’) use of ICT in classroom practice. Often, these barriers were organized around the teacher, such as teachers’ beliefs and attitudes, teachers’ knowledge/ skills and teachers’ commitments. The barriers were also organized around the educational institution, including some factors such as support provided to teachers (leadership support, technical support and administrative support). It should be noted that the role of the teachers was identified as the most important. However, one of the key issues with this categorisation is that it often ignores enabling factors and as such presents a limited view. The next section reviews research that does just this.

#### ***2.2.1.2 Attempts to identify enablers***

One of the popular efforts to study the conditions for successful use of technology innovations in the classroom is Zhao, Pugh, Sheldon and Byers’ (2002) and this is the focus of this analysis. Focusing on technology use in schools in the United States, these authors claimed that the success of teacher technology use depended on a number of factors: the “Innovator”-the Teacher (p. 489), the “Innovation” -the Project (p. 496) and the “Context”-the School (p. 502), which interacted with one another in various ways, thus suggesting that these factors were “complex and messy” (p. 482).

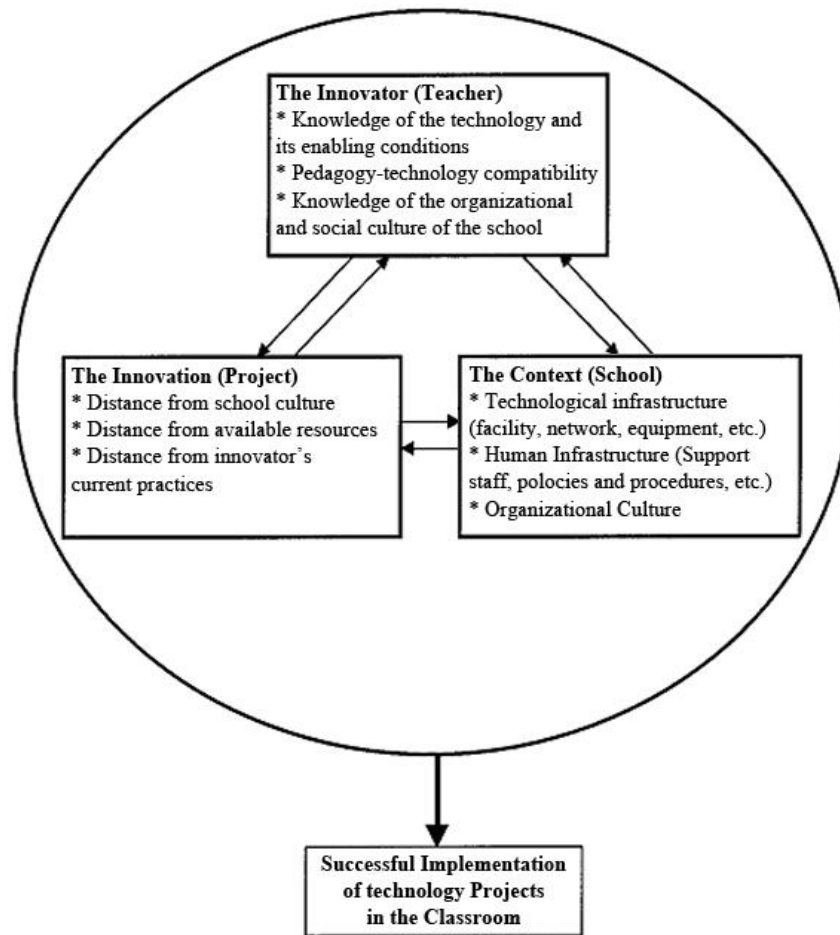
Zhao et al. (2002) emphasised that the Innovator-the Teacher had the most important role in deciding the success of technology-enhanced lessons. This perspective is shared by Groff and Mouza (2008). In order to do this, the teacher should have what Zhao et al. (2002) called “technology proficiency, pedagogical compatibility, and social awareness” (p. 489). In this respect, it is essential that teachers first have both the capacity to use technical equipment and knowledge of the conditions that facilitate the use of certain

technology in teaching. Furthermore, teachers who were more “reflective about their own teaching practice and goals [with certain technology]... in the sense that they consciously use technology in a manner consistent with their pedagogical beliefs” (p. 492) would most likely become successful when using technologies in their classes. Finally, teachers who knew how to interact and negotiate with administrators, technicians and other teachers about technological resources would be able to fully use technologies in their own practice. This is what Zhao et al. (2002, p. 494) termed as “social awareness”, which is teachers’ knowledge about the “social dynamics of the school, where to go for what type of support, and [being] attentive to their peers” (p. 494).

When it comes to the Innovation-the Project, Zhao et al. (2002) suggested that the success of a project depended on the nature of the project. In other words, a project would become successful if it was not “distant” (Zhao et al., 2002, p. 497) from the school culture, from the Innovator’s teaching practice and technological resources of the school where it was going to be carried out. This view again is shared by Groff and Mouza (2008). The more the project depended on other human factors such as the administrator, the technician and the peer in the school context, the less likely that it was going to achieve success.

The last domain is the context. Zhao et al. (2002) suggested that the enabling context conditions for teachers’ success in integrating technologies were supportive technical staff, administrator, policies and procedures, adequate technological infrastructure and support from other teachers. Figure 1 summarizes all of these factors.

Figure 1 Conditions for classroom technology integration (Zhao et al., 2002, p. 490)



To summarize, Zhao et al. (2002) emphasized that it was the Teacher-The Innovator and the interactions among the Innovator and the Innovation (technology) as well as the Context (school) that were important enablers to teacher use of ICT. Although Zhao et al. (2002) chose to study the factors affecting successful use of ICT by teachers in their classroom practice, they did not mention teachers' belief systems as a necessary condition, which other researchers identified as crucial (Groff & Mouza, 2008; Mumtaz, 2000). The next section considers research that categorises factors in other ways, including that by Peeraer and Petegem (2011) in Vietnam.

### ***2.2.1.3 Attempts to categorise factors in other ways***

Besides attempting to identify and categorise factors influencing teachers' use of ICT into barriers and enablers, researchers have also come up with other categorisations. This is detailed below.

#### **Mumtaz (2000)**

Like other researchers, Mumtaz (2000) was interested in categorising factors as enablers and barriers. However, she was also interested in exploring the relationship between factors. In her study that focused on school contexts in Western countries, she commented that the factors were “interlocking ... [between] institution, resources and the teacher” (p. 335). Mumtaz (2000) thus suggested that there are complex relationships among the factors. For example, Mumtaz (2000) insisted that if the school did not give teachers enough time and support to get used to ICT in their teaching, there would be teacher resistance to technological change. She also emphasized that inadequate resources would lead to limited ICT use and thus to limited ICT experience for teachers and students. For the teachers, important influencing factors included teachers' feelings, skills, attitudes, motivations, experience with and commitment to ICT usage. Mumtaz (2000) implied that teachers' theories of teaching and learning played a decisive role in the use of ICT in their practice. If teachers were not “enthusiastic” (Mumtaz, 2000, p. 338) about teaching with technology, they would choose to go without it, even when they were provided with enough facilities and network support. In Mumtaz's (2000) perspective, the factors in relation to the teacher “outweigh[ed] the school factors” (Mumtaz, 2000, p. 337). Of concern, however, is that Mumtaz's (2000) framework focused on a select set of teacher-related factors and did not consider the role of others, such as students, on teacher decision-making.

**Nyambane and Nzuki (2014)**

Nyambane and Nzuki (2014) listed factors that impact on teacher decision-making and also considered how the factors interacted with one another, like Mumtaz (2000). According to these authors, important factors influencing teachers' ICT use were professional learning, provision of technical resources, technical assistance from technicians and administrators. Also, the factors related to teachers encompassed teachers' attitudes (negative or positive) toward the technology and technology use process, teachers' technical capacity and confidence and teachers' demographic features such as gender, teaching experience and teaching workload. Nyambane and Nzuki (2014) also emphasized the "interdependence" (p. 13) among the factors. For example, a lack of time might prevent teachers from using the teaching resources at school. Likewise, a lack of training for necessary skills might impede teachers from using the available resources. The authors concluded that "teachers' confidence, competence and accessibility to resources [were] key factors for technology use in schools" (Nyambane & Nzuki, 2014, p. 14). Similar to Mumtaz (2000), the writers failed to take into consideration the student as an influencing factor.

**Vietnamese context: Peeraer and Petegem (2011)**

When it comes to research on ICT in Vietnam, Peeraer and Petegem (2011) developed a framework on the factors influencing teacher educators' use of ICT in five teacher education institutes in a number of Northern and Central provinces of Vietnam. They based the framework on existing studies and on their experience in working with teacher educators and pre-service teachers in Vietnam. In their view, teachers' use of ICT in teaching was the "dependent variable", which was affected by "non-manipulative factors such as gender, age and teaching subject" and "manipulative factors [including] access to computers, intensity of use, confidence and skills, attitudes toward ICT, conception of

student learning” (Peeraer & Petegem, 2011, p. 975). In other words, these two researchers only looked at teacher-related factors that influenced their ICT use in classroom practice. Provincial policies, in their view, added a contextual element to teachers’ ICT use.

Of concern is that this framework did not consider the possible influence of teachers’ peers, administrators, technicians and students, as identified by Groff and Mouza (2008) and Zhao et al. (2002). This could be a significant omission given that in Vietnamese culture, under the influence of Confucian ideology, the administrator has considerable power (Dinh, 2009). As well, while the framework considers the impact of provincial policies, it does not consider the possible role of the institution itself.

### **2.2.2 Issues with existing factor categorisation**

As the review has shown so far, researchers have attempted to identify and categorise factors influencing teachers’ use of ICT in their classroom practice. There are, however, a number of issues with this research. The first issue is around purpose or intent. The previous literature has had a range of intents and thus can only ever present a partial view of the complex issue around teacher decision-making. The second issue relates to the varied focus in this research, with some focusing only on the barriers and some only on the enablers. As such, this literature can only present one picture. The third issue relates to the practice of categorising and sub-categorising. While this is useful as it enables key ideas to be emphasized, it can lead to issues around messiness. For example, some researchers looked at the barriers and divided them into sub-barriers (such as BECTA, 2004), while others simply identified the degree of perceived impact, such as Ertmer et al. (1999). A fourth issue relates to how the interactions among factors are represented or not. For example, some representations look at them in general terms, such as Mumtaz (2000), while others claim that certain factors interact with one another in a particular

way (Nyambane & Nzuki, 2014). As a result, these representations can potentially depict the complexity of ICT use by teachers in an even messier way.

This review has also suggested that the teacher is an important factor in integrating ICT (Groff & Mouza, 2008; Hew & Brush, 2007; Mumtaz, 2000; Zhao et al., 2002). However, when it comes to exploring this influence, a techno-centric position is often adopted in the literature, that is, one in which the focus is on teacher technical knowledge and skill, computer competence or computer literacy (Albirini, 2004; Albirini, 2006; Aydin, 2013; Bingimlas, 2010; Chen 2008b; T. X. Dang, 2014; Gorder, 2007; He, Puakpong, & Lian, 2013; Mollaei & Riasati, 2013; Park & Son, 2009). In recent times, Mishra & Koehler (2006) have attempted to address this issue through the development of their TPACK framework.

The following section introduces the TPACK framework as an influential conceptualisation of the knowledge teachers require to use ICT in practice. It then uses the TPACK framework to define an EFL teachers' knowledge to use ICT to teach. This is a factor that influences teacher use of ICT in classroom teaching. In doing so, it recognises that there are a number of issues with this framework.

### **2.2.3 The TPACK framework**

#### ***2.2.3.1 History***

The TPACK framework first gained considerable attention in 2006 in an article entitled "Technological Pedagogical Content Knowledge: A framework for teacher knowledge" (Mishra & Koehler, 2006). The framework was built on Shulman's (1986, 1987) original idea that teachers required a special knowledge type to effectively deliver instruction. This was referred to as "Pedagogical Content Knowledge" (Shulman, 1986, p. 9). According to Shulman (1987), Pedagogical Content Knowledge is a special type of knowledge that:

... represents the blending of content and pedagogy into an understanding of how particular topics, problems or issues are organised, represented and adapted to the diverse interests and abilities of learners, and presented for instruction. Pedagogical content knowledge is the category most likely to distinguish the understanding of content specialist from that of pedagogue (p. 8).

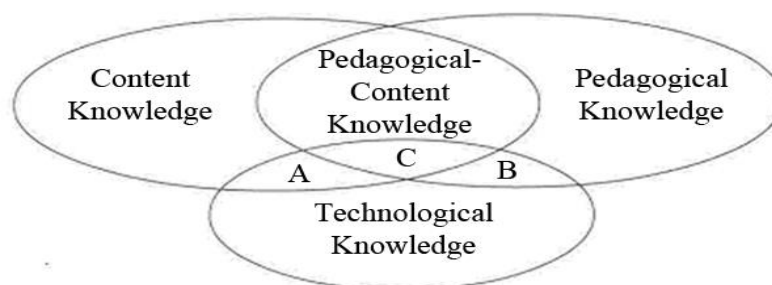
Shulman (1986, 1987) “never mentions technology specifically” (Lubke, 2013, p. 4) simply because Shulman’s model was developed before the rapid increase in the development of ICT and their impact on teachers and teaching. The development of ICT demands “a specialized knowledge that is more than procedural and that enables teachers to adapt their practices as the tools evolve” (Lubke, 2013, p. 4).

Before Mishra and Koehler (2006), a number of researchers had attempted to incorporate ICT into Shulman’s (1986, 1987) model. This includes Pierson (2001), Angeli and Valanides (2005) and Niess (2005), whose studies are explored in the ensuing paragraphs. However, it is important to note that these conceptualisations did not gain the same level of support from the research community that the later framework by Mishra and Koehler (2006) did.

To begin with, Pierson (2001) considered that technological knowledge was an essential part of a teacher’s knowledge in order to use technology in his/her teaching. Pierson (2001) insisted that “A teacher who effectively integrates technology would be able to draw on extensive content knowledge and pedagogical knowledge in combination with technological knowledge” (p. 427). Pierson (2001) stated that “the intersection of these three knowledge areas ... [which she termed] technological pedagogical content knowledge would define effective technology use” (p. 427). The possible relationships among the necessary types of knowledge proposed by Pierson (2001) are depicted in Figure 2 below.



*Figure 2 Relationships among content, pedagogical and technological knowledge*  
(Pierson, 2001, p. 427)



When discussing the relationships among the content, pedagogical and technological knowledge of a teacher, Pierson (2001) suggested that “Section A represents knowledge of content-related technology resources. Section B represents such knowledge as the methods to manage and organise learning technology use. Section C represents the intersection, or technological pedagogical content knowledge, which is true technology integration” (p. 427).

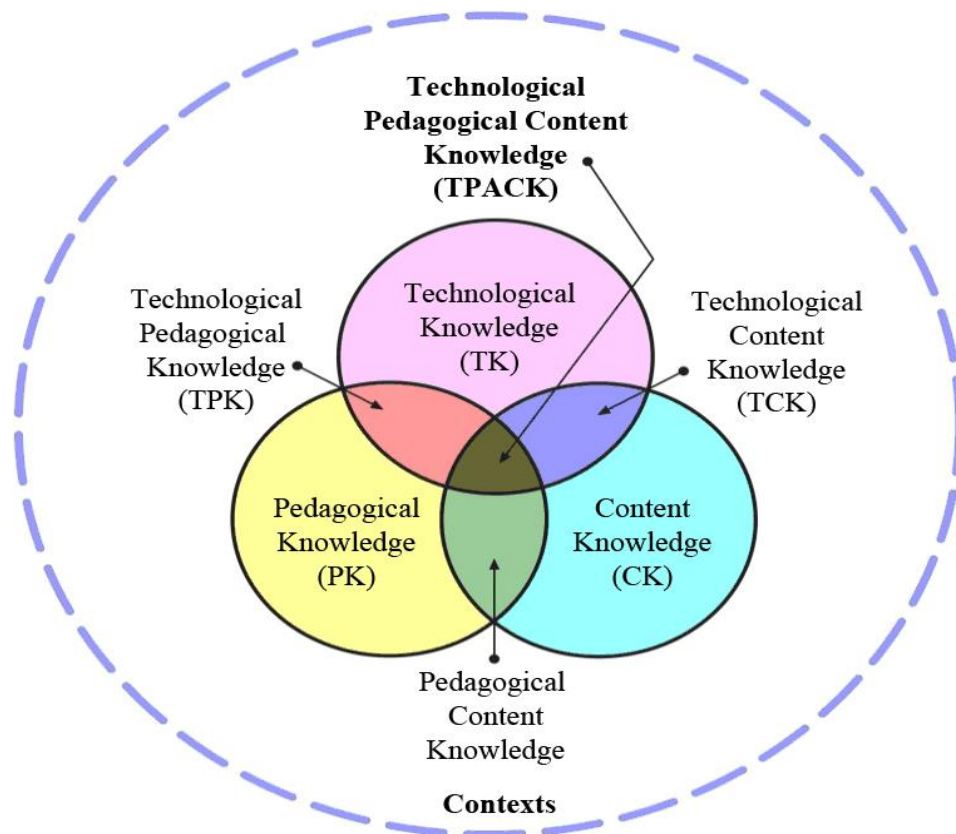
In another attempt, Angeli and Valanides (2005, p. 292) proposed a model called “ICT-related PCK”, which in some respects was different from that proposed by Pierson (2001). In their view, ICT-related PCK “constitutes a special amalgam of several sources of teachers’ knowledge base including pedagogical knowledge, subject area knowledge, knowledge of students, knowledge of environmental context, and ICT knowledge” (Angeli & Valanides, 2005, p. 294). Thus, they included knowledge of students and contexts, unlike Pierson (2001). Of these types of knowledge, ICT knowledge is defined as “knowing how to operate a computer, knowing how to use a multitude of tools/software, and about their affordances” (Angeli & Valanides, 2005, p. 294). These two researchers also emphasised that ICT-related PCK should be considered as an “integrated body of knowledge” that must be “acquired ... simultaneously” (Angeli & Valanides, 2005, p. 294).

Similar to Angeli and Valanides (2005), Niess (2005) argued that knowledge of technology, content and pedagogy interconnected when teachers used ICT. In her model, technology connected with PCK to form what she called “Technology PCK-TPCK” (p. 510). To Niess (2005), TPCK was the “overarching conception of their subject matter with respect to technology and what it means to teach with technology” (p. 510).

The later development of the TPACK framework by Mishra and Koehler (2006) is similar to earlier frameworks in that it also sought to develop a more explicit conceptualisation of technology knowledge which was perceived as missing in Shulman’s (1986,1987) PCK (Abbitt, 2011). Their subsequent conceptualisation, as evidenced by the sheer number of papers published, indicates that it is a most influential adaption.

Mishra and Koehler (2006) argued that Technological Knowledge must be added as a separate domain to the Content Knowledge and Pedagogy Knowledge constructs originally conceptualised by Shulman (1986). Mishra and Koehler (2006) used three circles to represent each of these separate knowledge domains. This is unlike Pierson (2001), who included a fourth circle to explicitly represent PCK. The result was a framework with “three main knowledge domains (Content Knowledge-CK, Pedagogy Knowledge-PK and Technology Knowledge-TK), three intersecting knowledge pairs (Pedagogical Content Knowledge-PCK, Technological Content Knowledge-TCK, and Technological Pedagogical Knowledge-TPK) and one triad, Technological Pedagogical Content Knowledge (TPACK)” (Jordan & Dinh, 2012, p. 319). In later conceptualisations, Context was explicitly represented by a circle that enveloped the domains (Jordan & Dinh, 2012). Figure 3 presents a summary of this conceptualisation.

Figure 3 The TPACK framework (Mishra & Koehler, 2006)



(Source: <http://www.citejournal.org/articles/v9i1General1Fig1.jpg>)

Mishra and Koehler (2006, p. 1024) argued that their TPACK framework emphasized “the connections, interactions, affordances and constraints between and among content, pedagogy and technology”. Furthermore they suggested that “knowledge about content, pedagogy and technology is central for developing good teaching” (Mishra & Koehler, 2006, p. 1024).

Originally, they developed the TPACK framework from their research with pre-service teachers using a “learning by design” methodology (Koehler, Mishra, & Yahya, 2007, p. 744). Basically, this methodology is similar to a constructivist approach, in which learners actively build their knowledge by doing (Koehler et al., 2007). In their course of one semester, the pre-service teachers attended seminars and worked in small groups to “develop technology-rich solutions to authentic pedagogical problems, and thus

they learnt about technology and pedagogy by actually using and designing educational technology to teach specific content” (Koehler et al., 2007, p. 744). Koehler et al. (2007) argued that this approach helped expose pre-service teachers to the complex environment where technology, content and pedagogy interrelated, and thus would prepare them to do so in their future practice.

Although initially developed for teacher education, the TPACK framework has become a “powerful framework which has many potential generative uses in the research and development related to the use of ICT in education” (Chai, Koh, & Tsai, 2013, p. 32). In just a few years, hundreds of publications on different aspects of TPACK have been produced. For example, Abbitt (2011) identified 300 TPACK articles relating to teacher education on databases such as TPACK.org website, EBSCO, ERIC and EDITlib.org. Jordan and Dinh (2012), solely from the TPACK website, located some 286 articles published in the period of 2006-2011, in response to their key word search. Koehler, Shin and Mishra (2012) in another review located some 303 articles and papers from a number of databases, including PsychInFo, EDITlib and ERIC in the years 2006 to 2010 on “various techniques of measuring TPACK” (Koehler et al., 2012, p. 18). Voogt, Fisser, Roblin, Tondeur and Braak (2012) traced 55 peer-reviewed journal articles published between 2005 and 2011 from four databases such as ERIC, Web of Science, Scopus and PsychINFO, also in response to their key word search. In a similar vein, Chai, Koh and Tsai (2013) located 74 TPACK articles on Web of Science, Scopus and EBSCOhost databases.

This large body of research has focused on a number of different aspects. One of the main areas of research has been in developing instruments to measure teacher TPACK, including the popular survey instrument by Schmidt, Baran, Thompson, Mishra, Koehler and Shin (2009). This survey instrument has often been adapted in different research

studies to measure teacher TPACK. For example, Jordan (2011) used this adapted survey instrument with 64 pre-service teachers in an Australian university, and concluded that these teachers had “more confidence in CK” (p. 22). Other researchers, such as Archambault and Crippen (2009) developed their own survey tool by drawing upon TPACK, and indicated that the teachers in the United States had more confidence in PK. Additionally, some researchers were interested in the impact of age on teachers’ TPACK such as Lee and Tsai (2010), while others were more concerned with the impact of gender (Jamieson-Proctor, Finger, & Albion, 2010; Jordan, 2011; Koh, Chai, & Tsai, 2010). Finally, a number of researchers were concerned with studying the reflection of teachers’ TPACK in reality, often through the examination of exploratory factor analysis (Archambault & Barnett, 2010; Koh et al., 2010; Koh, Woo, & Lim, 2013).

In the next section, I define each of the knowledge domains that I use in my study, drawing on those defined by Mishra and Koehler (2006) in their highly influential TPACK framework. It should be noted, that these definitions have also been influenced by the work of Shulman (1986, 1987) and by the research area of EFL teaching.

### ***2.2.3.2 Definition of the TPACK constructs of EFL teachers***

This section provides definitions of the seven TPACK constructs. The definitions are drawn mostly from the work of Mishra and Koehler (2006), from the work of Shulman (1986, 1987) and from relevant work in the area of EFL teaching. These definitions are used for the purpose of developing data collecting instruments in this study.

#### **Content Knowledge (CK)**

Content Knowledge (CK) is defined by Mishra and Koehler (2006, p. 1026) as “knowledge about the subject matter that is to be learnt or taught”. In order to be able to teach effectively, a teacher should have knowledge of “central facts, concepts, theories

and procedures” of the subject matter (Mishra & Koehler, 2006, p. 1026), and “rules of evidence and proof” (Shulman, 1986, cited in Mishra & Koehler, 2006, p. 1026).

In Mishra and Koehler’s (2006) view, CK is very different for different subjects such as Maths or English. This has particular bearing on this study involving EFL teachers. According to Brandley-Dias and Ertmer (2013, p. 114) “the potential of TPACK to facilitate technology-enabled subject-specific teaching ... has yet to be fully explored and/or reported”. There have been recent efforts to map the specific content knowledge in some disciplines, as illustrated on the wiki site produced by Harris and Hofer (see <http://activitytypes.wmwikis.net/>), but to date there has been little research relating to EFL teachers.

Thus, in this study I also draw on the research by Kang, Ni and Li (2010), who suggest that the CK of an EFL teacher includes:

...language skills: vocabulary usage, conversation function, and using language to solve problems, linguistic components: pronunciation, phonetics and styles of speech, and cultural understanding: comparing the similarities and differences between English-speaking countries and non-English-speaking countries (p. 3877).

#### **Pedagogical Knowledge (PK)**

In Mishra and Koehler’s definition (2006, p. 1026), Pedagogical Knowledge (PK) encompasses “generic form of knowledge that is involved in all issues of student learning, classroom management, lesson plan development and use and student evaluation”. Cox and Graham (2009) similarly define it as the general knowledge about teaching pedagogies that any teacher should know, and which may be independent of CK. Therefore in this study, the PK of an EFL teacher encompasses those elements discussed above.

#### **Pedagogical Content Knowledge (PCK)**

To Shulman (1986), PCK is defined as the knowledge of

.... the most regularly taught topics in one's subject, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations and demonstrations ... including an understanding of what makes the learning of specific concepts easy or difficult: the concepts and preconceptions that students of different ages and backgrounds bring with them to the learning (p. 9).

Mishra and Koehler (2006, p. 1027), drawing on Shulman (1986), argue that a teacher's PCK should include "knowing what teaching approaches fit the content, and likewise, knowing how elements of the content can be arranged for better teaching". Mishra and Koehler (2006) emphasise that this type of knowledge also includes knowledge about learners and learners' characteristics.

In this study, I also draw on the research by Murray and Christinson (2010) as it specifically involves the PCK of EFL teachers. They suggest a number of elements including: 1) teacher knowledge about the "target language [English] input and how to modify this input" (Murray & Christinson, 2010, p. 172) to suit different learners, and 2) teacher knowledge about "learners' interaction" (Murray & Christinson, 2010, p. 173) and the ways they use the target language to negotiate meaning (Murray & Christinson, 2010), and 3) teachers' knowledge to select effective teaching strategies to guide students' learning in the EFL context (whether the teaching strategies follow behaviourist or communicative language teaching methods (Bax, 2003), as long as these strategies suit learners' characteristics).

#### **Technological Knowledge (TK)**

Mishra and Koehler (2006, pp. 1027-1028) define TK as "skills to operate technologies such as installing or removing devices/software programs, or creating and archiving documents" and includes the "abilities to learn and adapt to new technology" (Mishra & Koehler, 2006, p. 1028). With Schmidt et al. (2009, p. 145), they suggest that TK also involves being able "to solve technical problems, to learn technology easily, to keep up

with important technology, to play around with technology, to know a lot of technologies, to have technical skills and to have opportunities to work with different technologies.”

As a result, in this study, the TK of EFL teachers involves teachers knowing how to use common technological applications, to troubleshoot basic technical problems, and to keep up-to-date with new technologies.

### **Technological Content Knowledge (TCK)**

Technological Content Knowledge (TCK) is knowledge about “the manner in which technology and content are reciprocally related” (Mishra & Koehler, 2006, p. 1028). By defining this knowledge domain in this way, Mishra and Koehler (2006) are suggesting that technology could be used to change the delivery of the subject matter.

For the purposes of this study, TCK includes the following:

- 1) Teachers’ knowledge about ICT applications for teaching English language skills;
- 2) Teachers’ knowledge about ICT applications for teaching English linguistic knowledge;
- 3) Teachers’ knowledge about ICT applications for teaching English culture.

### **Technological Pedagogical Knowledge (TPK)**

Technological Pedagogical Knowledge (TPK), according to Mishra and Koehler (2006, p. 1028), is knowledge of “the existence, components and capabilities of various technologies as they are used in teaching and learning settings, and knowing how teaching might change as the result of using particular technologies”. Basically, this means that a teacher needs to know which pedagogy is used with each technology in their instruction.

This study considers TPK as:

- 1) Teachers’ knowledge about learning theories with ICT;



- 2) Teachers' knowledge about using ICT to cater for different learning styles;
- 3) Teachers' knowledge about using ICT to manage the class;
- 4) Teachers' knowledge about using ICT to prepare lessons;
- 5) Teachers' knowledge to assess student learning with ICT.

#### **Technological Pedagogical Content Knowledge (TPACK)**

Finally, Technological Pedagogical Content Knowledge (TPACK) is the type of knowledge that requires an

...understanding of the representation of concepts using technologies, pedagogical techniques that utilise technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students' prior knowledge and theories of epistemology, and knowledge of how technologies can be utilised to build on existing knowledge and to develop new epistemologies or strengthen old ones...(Mishra & Koehler, 2006, p. 1029).

In their perspective, TPACK is a complex type of knowledge that involves the interplay of the three knowledge components.

In light of Mishra and Koehler's (2006) definition, this study defines TPACK as:

- 1) Teacher knowledge about theoretical foundation of technology-based EFL instruction, which include "communicative competence of learners ... and learner interactions [in using technology to learn]..." (Chapelle, 2009, p. 750),
- 2) Teacher ability "to design real-life tasks for students to learn English" with technologies (Kang, Ni, & Li, 2010, p. 3877),
- 3) Teacher ability to evaluate ICT applications, "tasks and [students'] performance" (Compton, 2009, p. 85) in a technologically-rich class.

### ***2.2.3.2 Issues with the TPACK framework***

Although the TPACK framework has been enthusiastically welcomed by researchers in the field of educational technology, a number of “theoretical concerns have continued to be raised in the literature” (Jordan, 2014, p. 225). These are explored in the next section.

#### **Lack of clarity around definitions**

First, there is a lack of clarity around the definition of each of the seven TPACK constructs (Chai, Koh, & Tsai, 2013; Graham, 2011; Jordan, 2014). This lack of clarity can be illustrated by the number of attempts to do so in the literature. Priest (2007), for example, revealed two different ways of defining PCK. The first way was from a linguistic perspective in which Pedagogical Content Knowledge consisted of Pedagogical as an adjective and Content Knowledge as the compound noun. Thus, he defined Pedagogical Content Knowledge as the type of content that is in line with pedagogical goals. The second way was from an educational researcher perspective. Priest (2007) claimed that PCK referred to teacher decision-making in relation to a specific educational context, which is affected by the specific teaching content and pedagogues in that context. Cox (2008), in her doctoral study, suggested that by 2008 there were at least 89 definitions of TPACK and its constructs. So and Kim (2009, p. 106) also defined only five constructs. These were 1) CK as “knowing about what to teach”, 2) PK as “knowing about how to teach in general”, 3) TK as “knowing about various technical tools and their capabilities”, 4) PCK as “knowing about how to teach particular subject matter content” and 5) TPCK as “knowing about how to represent subject matter with technology in pedagogically sound ways”. In another study, Koh et al. (2013) defined seven constructs but did so in a simplified way. They defined “1) TK as the knowledge of technology tools, 2) PK as the knowledge of teaching methods, 3) CK as the knowledge of subject matter, 4) TPK as the knowledge of using technology to implement teaching methods, 5)

TCK as the knowledge of subject matter representation with technology, 6) PCK as knowledge of teaching methods with respect to subject matter content, and 7) TPACK as knowledge of using technology to implement constructivist teaching methods for different types of subject matter content”.

This lack of clarity can also be demonstrated in studies that showed participant confusion regarding how to categorise items. Archambault and Crippen (2009) and Archambault and Barnett (2010) found that some teachers interpreted some survey items as belonging to particular domains, not consistent with their own. For example, in relation to the survey item ‘My ability to create materials that map to specific district/state standard’, some teachers interpreted it as belonging to PCK, while it was intended as CK by the researchers (Archambault & Crippen, 2009). This confusion around PCK and CK was also evident in another study (Archambault & Barnett, 2010, p. 1659), while confusion around PCK and TPACK was found in another (Archambault & Crippen, 2009).

As well as confusion around defining the knowledge domains, there are also issues in defining the boundaries between them (Jordan, 2014). This can be shown in Graham’s (2011, p. 1957) comments that “many researchers who have made serious attempts at measuring TPACK constructs have been challenged by the difficulty the model presents in distinguishing boundaries between the constructs in the model”. This is especially difficult in relation to constructs that “share a boundary in the model” (Graham, 2011, p. 1957). For example, the boundaries between two constructs that have a boundary such as TCK and TPK are “fuzzy indicating in their view a weakness in accurate knowledge categorisation or discrimination” (Angeli & Valanides, 2009, p. 157).

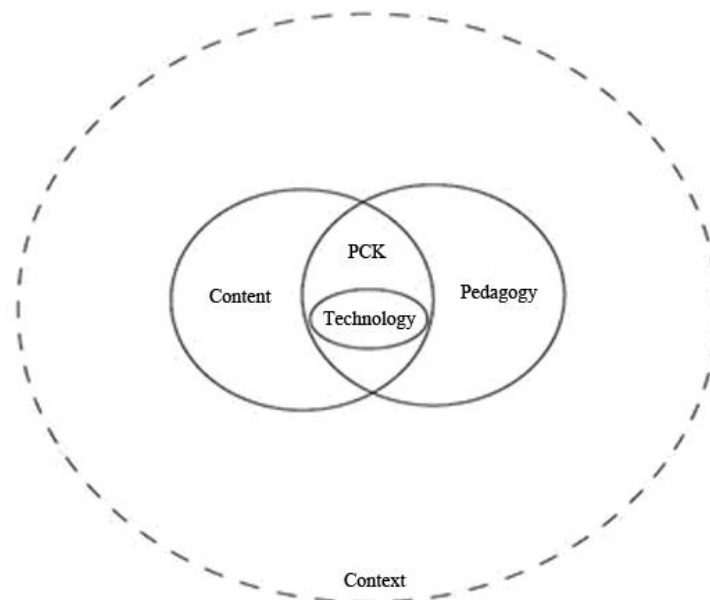
### **Lack of clarity in operation of the TPACK constructs**

Another main issue with the framework identified by researchers relates to the operation of the seven TPACK constructs. As Archambault and Crippen (2009, p. 74) pointed out, one issue with the TPACK domains was that “these domains seem[ed] confounded and ... difficult to separate ...”. In contrast, Cox and Graham (2009) emphasised the independence of such constructs as TPK and TCK from CK and PK respectively. They commented that TPK, which was “knowledge of the general activities that a teacher can engage using emerging technologies [should be] ...independent of a specific content or topic-CK” (p. 64). Similarly, TCK, which “refers to a knowledge of the topic-specific representations in a given content domain that utilise emerging technologies” [should be] ...independent of knowledge about their use in a pedagogical context-PK” (p. 64).

The TPACK framework (Mishra & Koehler, 2006) provides an influential model for the types of knowledge that a teacher needs to have to use ICT into practice (Voogt et al., 2012). However, there are a number of issues also evident in the literature. These include issues in defining each of the constructs and the boundaries between them, as well as the operation of the constructs. Partly in response to these concerns, Cox and Graham (2009), emphasised that as technology becomes popular in the educational context, perhaps, TPACK might “transform into PCK” (Cox & Graham, 2009, p. 64). Hughes and Scharber (2008) claimed that TPACK “might be a temporary concept” (p. 89). Similarly, Hofer and Swan (2006) stated that TPACK might be “a moving target” (p. 196). In addition, Brantley-Dias and Ertmer (2013, p. 117), in more recent times, have proposed that “TPACK should ... become embedded within other aspects of teachers’ knowledge, i.e., CK, PK and PCK”. They thus suggested that TPACK should be conceptualised as “concentric, rather than intersecting circles”. Brantley-Dias and Ertmer (2013) also suggested that it might be better if we went back to the previous efforts to define TPACK

before Mishra and Koehler (2006). Figure 4 details this proposed conceptualisation of TPACK.

*Figure 4* Conception of the relationship between technological and pedagogical content knowledge (Brandley-Dias & Ertmer, 2013, p. 118)



So far this discussion has suggested that teacher use of ICT is complex and is influenced by a large number of factors. It has shown that there has been a considerable amount of research in school education and higher education, which has examined these factors and that it has often identified and categorised factors, as barriers and enablers. It has also discussed how teacher decision-making around using ICT is influenced by their knowledge of technology, pedagogy and content and that this has been represented in various ways. This study, however, chooses to use the TPACK framework by Mishra and Koehler (2006), because it has had such an influence in the research field. At the same time, it recognises that there are a number of issues with this framework.

In the following section, I move away from research focusing on identifying and categorising factors, to research that considers how these factors operate or interact. This

is particularly important given that the focus of this study is on the impact of factors on teachers' decision-making. I draw upon two influential models, the first being the Diffusion of Innovations model (Rogers, 2003), which offers an explanation for an individual's decision making in relation to an innovation, as well as for the factors at an individual level and organizational level influencing the process. This model has often been applied to the implementation of ICT in school and university contexts (Sahin, 2006, cited in Phillips, 2014). The second model draws on the ecological perspective (Zhao & Frank, 2003) because it offers a more ICT-specific explanation, and is gaining considerable support in the literature.

#### **2.2.4 The Theory of Diffusion of Innovations (Rogers, 2003)**

The Theory of Diffusion of Innovations by Rogers (2003) has become one of the most influential theories in explaining how an innovation is diffused and adopted in a community (Albirini, 2004; Straub, 2009). Drawing on research studies across disciplines such as sociology, education, psychology, geography and other disciplines (Rogers, 1995), the framework provided comprehensive theoretical foundations for more than 5,200 published papers and projects (Rogers, 2003). Rogers claimed that the revised version of the book *Diffusion of Innovations* published in 2003 is intended to take into account the appearance and widespread acceptance of the computer and the Internet as an innovation.

Because this study is concerned with the factors influencing EFL teachers' use of ICT in their classroom teaching at a university, it considers 1) the use of ICT by teachers as a decision-making process in relation to ICT as an innovation, and 2) teacher use of ICT as adoption of the innovation at individual level in a context of an educational organisation. This study, therefore, employs the five elements of the Diffusion of Innovations Theory (Rogers, 2003), namely the Innovation-Decision Process by individuals, Adopter's

characteristics, Attributes of Innovations, Communication Channels, and Innovation in Organisations to provide a perspective to look at teachers' decision-making in relation to ICT, as well as the factors that influence this decision-making, at an individual level and organisational level in an organisation. These are explored in the ensuing sections.

#### ***2.2.4.1 The Innovation-Decision Process***

Rogers (2003) states that there are five stages that an individual goes through when deciding to adopt an innovation. These five stages include the “Knowledge Stage, Persuasion Stage, Decision Stage, Implementation Stage and Confirmation Stage” (p. 169). In the Knowledge Stage, individuals learn about the presence of an innovation, and thus develop an understanding about the “functions of the innovation” (Rogers, 2003, p. 216). Through this stage, individuals form “favourable or unfavourable beliefs about the innovation” (Rogers, 2003, p. 216), and then decide “to adopt the innovation or reject [it]” (Rogers, 2003, p. 216). Then comes the Implementation Stage where individuals actually put the innovation into practice. In this stage, individuals will decide to stop implementing the innovation or continue implementing it and thus proceed to the Confirmation Stage.

Rogers (2003) makes it clear that although the Innovation-Decision Process seems to involve the five linear stages, this division of the decision-making process by individuals is only “a means of simplifying a complex reality, so as to provide a basis for understanding human behaviour” (p. 195). Because “individuals passing through the stages may or may not recognise when one stage ends and another stage begins ... there are no sharp distinctions between each stage” (Rogers, 2003, p. 195). As such, when considering teachers' decision-making in relation to ICT use, this study does not assume that there are five distinct stages with specific factors influencing each stage. Instead, this

study assumes that this decision-making is a complex process, influenced by a number of factors. These are detailed below.

#### ***2.2.4.2 Factors influencing the decision-making process at individual level***

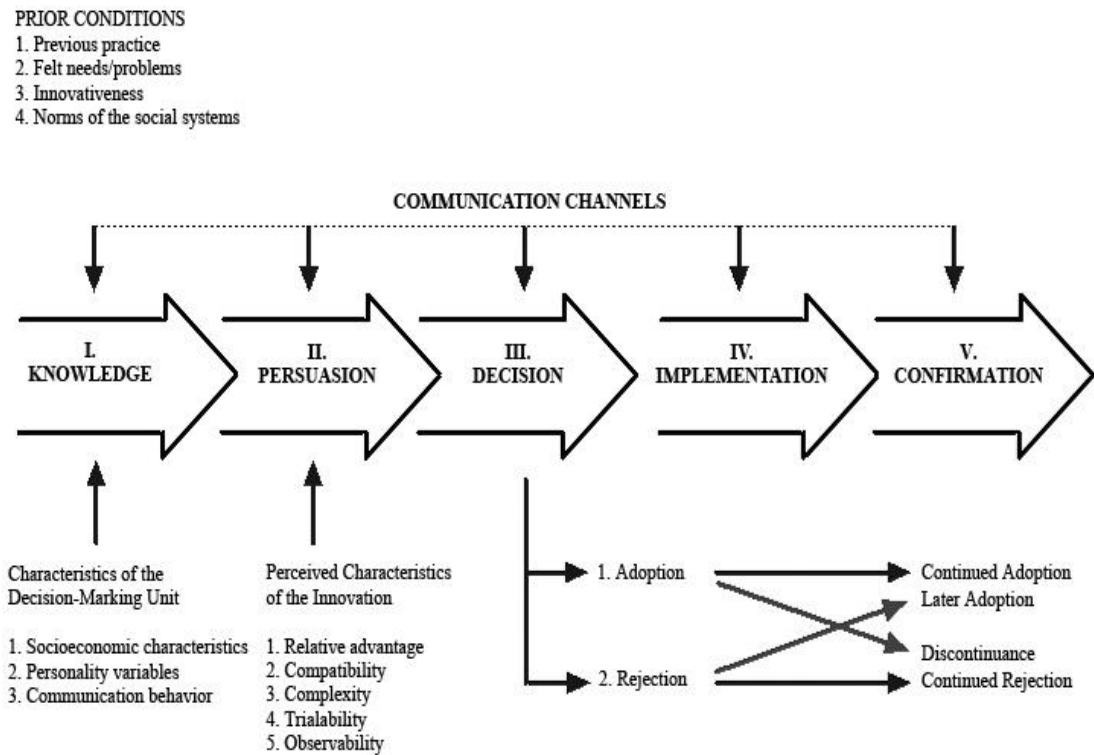
Rogers (2003) suggests that during this Innovation-Decision Process by individuals, a number of factors influence their decision-making at the individual level. These are characteristics of the decision-making unit (or Adopter's characteristics), perceived characteristics of the Innovation (Attributes of an innovation) and Communication Channels (Rogers, 2003, p. 170). First, Rogers (2003, p. 170) suggests that the adopter's characteristics, including "socio-economic status such as age, formal education, personality values and communication behaviour", affect his/her adoption of the innovation.

Second, there are five attributes of an innovation that influence an individual's adoption of the innovation. These five attributes are: "relative advantage, compatibility, complexity, trialability [and] observability" (Rogers, 2003, p. 36). "Relative advantage" is defined as "the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, p. 229). The second attribute of an innovation that affects adoption is its compatibility, which means that an innovation that is consistent with individuals' knowledge and practice would be more easily adopted, and vice versa. Another attribute of an innovation that has a role to play in the adoption of the innovation is its complexity, which means "the degree to which an innovation is perceived as relatively difficult to understand and use" (Rogers, 2003, p. 257). The last two attributes of an innovation that affect its adoption by individuals are trialability and observability. Trialability refers to "the degree to which an innovation may be experimented with on a limited basis" (Rogers, 2003, p. 258). Finally, observability is "the degree to which the results of an innovation are visible to others" (Rogers, 2003, p. 258). The underlying idea



of observability is similar to what Straub (2009, p. 631) called “unspoken peer pressure”—if other members in a social system or a community have already adopted an innovation whose effects could be clearly seen, an individual will be more likely to adopt that innovation given what he/she has seen in relation to its effects. Finally, communication channels tend to influence an individual’s decision to adopt an innovation. Defined as “the means by which messages get from one individual to another” (Rogers, 2003, p. 18), communication channels could encompass mass media channels, interpersonal channels, and interactive communication over the Internet. Rogers (2003) insists that among the above-mentioned communication channels, interpersonal communication channels are the ones most people depend on when evaluating an innovation, especially channels with other individuals who have already adopted the innovation and are similar to them. Figure 5 summarises these stages in the Innovation-Decision Process by individuals, with a number of factors associated with individuals that affect their decision-making.

Figure 5 Stages in the Innovation-Decision Process (Rogers, 2003)



(Source: <http://people.ucalgary.ca/~dmjacobs/phd/diss/Image74.gif>)

### 2.2.4.3 Factors influencing the decision-making process at the organisational level

Besides the factors associated with individuals that affect their decision-making in relation to an innovation, there are also a number of influencing factors associated with the organisation. This is the Innovation in Organisation aspect that is discussed below.

Rogers (2003) states that there are also five main elements that influence the diffusion of an innovation in an organisation, which is “a stable system of individuals who work together to achieve common goals through a hierarchy of ranks and a division of labour” (Rogers, 2003, p. 404). These five elements include: “pre-determined goals, prescribed roles, authority structure, rules and regulations, and informal patterns in an organisation” (Rogers, 2003, p. 404) and are explored below.

Rogers (2003) argues that pre-determined goals are the main purpose for the existence of an organisation, and that these influence the structure of an organisation. He argues

that prescribed roles in the organisation are “a set of activities to be performed by an individual occupying a given position” (Rogers, 2003, p. 404). He suggests that authority structures refer to the structure of an organisation, in which the positions/roles are “organised in a hierarchical authority structures that specifies who is responsible to whom, and who can give order to whom” (Rogers, 2003, p. 404). Rules and regulations are a “formal, established system or written procedures [that] govern decisions and actions by an organisation’s members”. Rogers suggests that in adopting an innovation, this formal structure can help individuals reduce uncertainties about the innovation. Last, he suggests that informal structures, as its name suggests, are the “interpersonal networks linking a system’s members, tracing who interacts with whom and under what circumstances” (Rogers, 2003, p. 24).

Rogers indicates that in an organisation, there are three main types of innovation decisions: “optional innovation decisions ... collective innovation decisions ... and authority innovation decisions” (Rogers, 2003, p. 38). “Optional innovation decisions” (Rogers, 2003, p. 38) involve voluntary decisions to adopt an innovation by an individual, who is not influenced by other members of a social system. This is similar to the bottom-up approach of implementing changes. Additionally, “collective innovation decisions are usually made by consensus by all members of a social system” (Rogers, 2003, p. 38). Finally, “authority innovation decisions ... are made by a few members of a social system who possess power [over other members of the system]” (Rogers, 2003, p. 38). The idea behind authority innovation decisions is similar to the top-down approach of implementing changes in a system.

In summary, the Theory on Diffusion of Innovations (Rogers, 2003) can provide a perspective on teachers’ decision-making in relation to ICT use, as well as the factors influencing this decision-making. Some factors at the individual level can include their

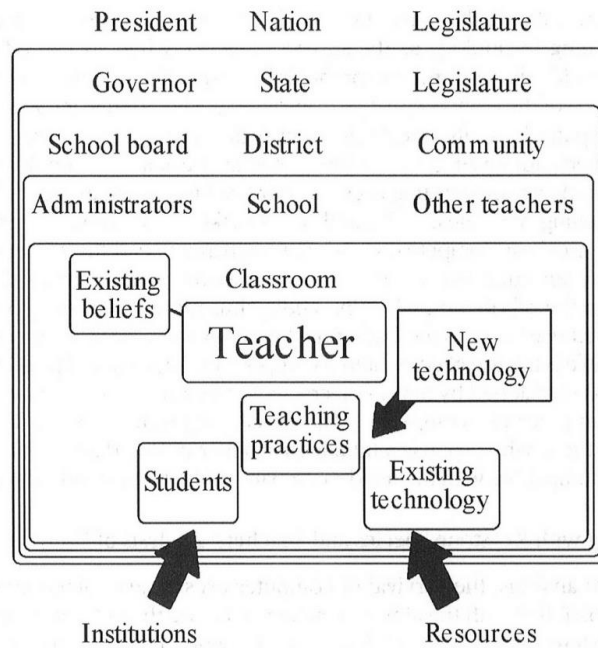
characteristics as well as their perceptions on the five attributes of the technology: relative advantage, compatibility, complexity, observability and trialability, and communication channels. At the organisational level, the factors could encompass prescribed roles, rules and policies of technology use, formal and informal structure of the organisation.

### **2.2.5 The ecological perspectives (Zhao & Frank, 2003)**

Zhao and Frank (2003) provided a theoretical lens to look at the factors and interactions among the factors specifically affecting teachers' use of technology in classroom practice, which was called the "ecological perspective" (Zhao & Frank, 2003, p. 807). They were critical of a large number of previous research studies that focused on long lists of factors in isolation. Zhao and Frank (2003, p. 810) argued that teachers' ICT use has a "dynamic nature", so research should focus on "the how" of these dynamics. In other words, the factors affecting teachers' use of ICT should be studied in relation to their interaction with one another.

Based on a research project conducted with 19 schools in the United States, Zhao and Frank (2003) developed a framework on the factors and the interaction among these factors (Figure 6). This framework was built on an ecological point of view, which considers the school where technology is integrated as "an ecosystem" (Zhao & Frank, 2003, p. 811) in which technology use is considered to be living things.

Figure 6 The school ecosystem (Zhao & Frank, 2003, p. 815)



Zhao and Frank (2003, p. 816) made it clear that in a school as an ecosystem, “teachers, administrators, librarians, media specialists, technology coordinators and students make up the biotic components”, and “technology infrastructure, scheduling, buildings, subjects and grades of students are the abiotic components”.

When technologies are introduced into a school, they are often considered “an invading species” (Zhao & Frank, 2002, p. 812), which come to interact mostly with teachers, who are the “keystone species” (Zhao & Frank, 2003, p. 812) facing the invading species. This is a “dynamic process where the species co-evolve and adapt to each other” (Zhao & Frank, 2003, p. 817). For example, when teachers are given chances to experience computer uses in their teaching, they may be able to see how technology can help fulfill their teaching goals and thus decide to adopt the technology. When they use the technology more, they can develop their competency, which may lead to their experimenting with different uses of the technology. Therefore, in a classroom within a

school setting, “the survival of computer use will be determined largely on their compatibility with the aims of the teachers” (Zhao & Frank, 2003, p. 816).

The perspective also placed an emphasis on the school context, which has an influence on computer use by teachers. For example, schools can provide teachers with a chance to experiment with new technologies, or can push teachers to use technology in their practice. At the highest level, federal and state government policies can be seen as “geological forces that shape the general landscape of the school, and thereby have some effect on how and to what degree teachers use technology” (Zhao & Frank, 2003, p. 816).

Thus, the ecological perspective of technology use in the school context (Zhao & Frank, 2003) acknowledges the school dynamics in technology use. In other words, the perspective takes into consideration the factors in relation to the “biotic components” of the school system such as the teacher (and also other teachers), the student, the technician, the administrator and the “abiotic component” such as the technology itself. These components can interact with one another in various ways. This perspective also acknowledges the role of government policies in technology use in classroom teaching by teachers.

In summary, both the Diffusion of Innovations Theory (Rogers, 2003) and the ecological perspective (Zhao & Frank, 2003) are influencing models to explain how various factors can impact on teachers’ decision-making in relation to an innovation. Individually, they can offer only a partial representation. Therefore, I decided to draw upon both models in order to provide a more comprehensive explanation of how these factors operate and relate. I do so specifically in relation to research around EFL teacher decision-making in relation to ICT. This discussion is detailed in the next section.

## **2.2.6 Research findings on factors influencing EFL teachers' use of ICT**

This discussion on research findings on factors specifically influencing EFL teachers' use of ICT is organized around the two categories used by Zhao and Frank (2003), biotic factors and abiotic factors. Within each of these categories, relevant elements from Rogers (2003) were applied. Thus, there are five groups of biotic factors, which include teacher-related factors, student-related factors, peer-related factors, technician-related factors, and administrator-related factors; and one group of abiotic factors, which involves technology-related factors. For each category of factors, a number of the factors are reviewed in relation to the individual such as *adopters' characteristics* and four attributes of an innovation such as *relative advantage, observability, compatibility* and *complexity*, which were identified in the Diffusion of Innovations Theory (Rogers, 2003) as potentially influencing teachers' use of ICT. This section is not concerned with the fifth attribute of an innovation, that is, *trialability* as a potentially influencing factor in light of the Diffusion of Innovations Theory (Rogers, 2003). The reason is that this study focuses on the teachers' use of ICT, so this study assumes that the teachers do not need to test run ICT in their classroom teaching. A number of other factors are reviewed in relation to the organization such as *prescribed roles, authority structure, and rules and regulations* (Rogers, 2003).

### **2.2.6.1 Biotic factors- Teacher-related factors**

#### **Teachers' background – Adopters' characteristics (Rogers, 2003)**

Previous research (in schools and universities) suggests that EFL teachers' gender, years of teaching experience, age, main area of specialization and highest qualifications have a role to play with their use of ICT in their classroom teaching, though the findings are somewhat contradictory.

In terms of the relationship between teachers' gender and their use of ICT, Topkaya (2010) argued that of the nearly 300 pre-service teachers of English at a Turkish university, males tended to have more self-confidence in using computers than females. Similarly, Mahdi and Al-Dera (2013) claimed that there was a considerable difference in ICT use between male and female EFL teachers in a Saudi Arabian university. In contrast, Mollaei and Riasati (2013) concluded that there was no gender difference in Iranian EFL teachers' attitude to the use of computers for classroom teaching. Similarly, Rahimi and Yadollahi (2011) found that there was no connection between Iranian EFL teachers' gender and their technophobia. They concluded that "psychological gender rather than biological gender has an influence on teachers' computer anxiety" (p. 206).

When it comes to teaching experience and teachers' use of technology, Li and Walsh (2011) and Rahimi and Yadollahi (2011) found that there was a negative correlation between the numbers of years of teaching and teachers' use of computers, that is, teachers with more years of teaching experience used computers less than those with fewer years. However, Alkahtani (2011) found that the number of years of teaching experience (ranging from five to 20 years) of the Saudi Arabian EFL teachers had no impact on their use of technology in classes. Mahdi and Al-Dera (2013) also found a similar result with the EFL teachers from a Saudi Arabian university.

Similarly, age was found to have a relationship (whether negative or positive) with the EFL teachers' uptake of instructional technology in Lam's (2000), Boulter's (2007) and Li and Walsh's (2011) research studies. In contrast, no relationships between teachers' age and their use of ICT were found in Alkahtani's (2011) and Madhi and Al-Dera's (2013) studies.

The main subject content or skills a teacher teaches seems to relate to their ICT use. As pointed out by Alkahtani (2011), the Saudi Arabian EFL teachers in her study reported



that their teaching of listening, pronunciation, reading, writing and vocabulary rather than other subjects could be best enhanced by ICT. Additionally, Celik (2013) reported that more Turkish EFL teachers used the Internet to teach reading and writing skills than those who used the Internet to teach listening, speaking and writing.

Contrasting findings are also reported with regard to teachers' highest qualification and their ICT use. Sadeghi, Rahmany and Doosti (2014) found that EFL teachers from Iran who hold a PhD have more positive attitudes towards using ICT in their practice. Sadeghi et al. (2014), however, found no difference in the reported attitude towards ICT by teachers holding a Masters' or Bachelors' Degree.

#### **Teachers' beliefs in ICT benefits – Perceived relative advantage (Rogers, 2003)**

As far as teachers' beliefs are concerned, the EFL teacher's beliefs in the benefits of technologies toward his/her practice seem to have a role to play. For example, computers were perceived by the teachers "as a motivator" (Kim, 2008, p. 250) to students' learning. The teachers believed computers could provide them with "authentic materials, authentic interaction with native speakers and collaborative activities ... and a variety of activities and different medium" (p. 250). In this sense, Albirini (2006) also suggested that teachers' perceptions of computer benefits are the predictors of the EFL teachers' positive attitude toward computers.

In spite of this, some EFL teachers needed to be persuaded about the benefits of ICT toward their classroom teaching (Lam, 2000; Ma & Yuen, 2002). A number of teachers in contrast had a positive attitude toward the benefits of ICT (Dang, 2014; Dinh, 2009; Li & Ni, 2011; Park & Son, 2009; Saglam & Sert, 2012). Indeed, the more they used ICT, the more they believed in the benefits of ICT in their practices. These included the Turkish EFL teachers in the study by Mathews-Aydinli and Elaziz (2010). These teachers

reported that “their appreciation of IWBs [interactive whiteboards]... [for]... its flexibility increased the more they used them” (Mathews-Aydinli & Elaziz, 2010, p. 248).

#### **Teachers’ knowledge and skills - TPACK (Mishra & Koehler, 2006)**

Teachers’ skills and knowledge also seems to be an important factor in EFL teacher use of ICT in their practice (Chen, 2008a; Hu & McGrath, 2012). Several reasons are put forward to support this view, such as that it is a pre-requisite for their ICT use because even if teachers have positive attitude towards using technology in their classroom, without relevant knowledge and skills, they are unable to do so (Hu & McGrath, 2012). Next, “the effectiveness of language instruction depends on the knowledge, skills and teaching methods of those who incorporate them” (Chen, 2008a, p. 555).

In contrast, a lack of knowledge and skills could be a major impeding factor to teachers’ integrating technology in their classroom instruction, which is referred to as “second-order barriers” (Galvis, 2012, p. 108). In fact, research has shown that this second-order barrier could make the teacher feel uncomfortable about using technology in a class, and thus requires the teacher to invest more time and effort in their instruction (Park & Son, 2009), and could eventually add more pressure to the teachers’ already heavy workload. These second-order barriers relate directly to the teacher, and are very difficult to overcome without proper support (Galvis, 2012).

Although EFL teachers’ knowledge and skills appear to be important to their ICT use in classroom practice, not many research studies mention specifically what the knowledge and skills are. When discussing teachers’ knowledge and skills, a great many studies either mention teachers’ technical competence, such as the ability to function software and hardware components, or state generally that the knowledge and skills are “ ICT pedagogy in English language teaching” (Hu & McGrath, 2012, p. 153), which oversimplifies the technology use process (Mishra & Koehler, 2006). This study, while

acknowledging that teachers' knowledge and skills to use ICT into classroom teaching are important, looks at the EFL teachers' knowledge and skills in light of the TPACK framework (Mishra & Koehler, 2006). Thus, this study considers the EFL teachers' knowledge and skills as teachers' TPACK. This has been explored in section 2.2.3 above.

#### **Teachers' commitment to use ICT**

Another factor that influences teachers' use of ICT in classroom practice is their commitment to use ICT (Mumtaz, 2000). However, this factor does not exist in isolation; in contrast, it is the consequence of other factors. For example, Chen (2008b) suggested that EFL teachers in Taiwan will stop being committed to using ICT in their instruction if they feel isolated and are without peer support in using ICT.

#### ***2.2.6.2 Biotic factors-Peer-related factors – Perceived observability (Rogers, 2003)***

In an educational institution, teachers' use of ICT tends to be influenced by the support, willingness to share resources, and commitment from their peers. In some cases, these could have a more important impact on their ICT uptake than the formal professional development they received from their institution (Zhao & Frank, 2003). When using ICT in teaching English, Vietnamese EFL teachers tend to turn to their peers for support (Dinh, 2009). Therefore, community of support among teachers is necessary, so they can "exchange ideas, share experience and obtain emotional support" (Chen, 2008b, p. 1025) with other teachers who are in the same situation to "overcome initial frustration" (Chen, 2008b, p. 1025).

In terms of resources sharing, Egbert, Paulus and Nakamichi (2002) found that teachers' colleagues were the common source of idea exchanges about ICT activities in their lessons. Li and Walsh (2011) confirmed that the EFL teachers in their study were willing to adopt new technology when they shared resources with their peers. These teachers stressed the importance of their peers' sharing their ICT-based lesson plans with

them because it would then be easier for them to learn how to use ICT in their specific contexts. Finally, peer commitments can even help teachers' continuous use of ICT. A teacher in Chen's study (2008b, p. 1023) who participated in a cooperative project where she was helped by other "tech-savvy" teachers to create learning materials online, still continued to do so later.

#### ***2.2.6.3 Biotic factors-Student-related factors – Prescribed role (Rogers, 2003)***

Learners in classrooms, in which teachers use ICT, also have an influence on teachers' ICT use (Kuo, 2008). Research studies have indicated that when EFL teachers perceived that students were motivated to use of ICT, they were more likely to adopt ICT use. For example, Dinh (2009) concluded that the Vietnamese EFL teachers in her study used ICT because their students needed ICT for their language learning. Mollaei and Riasati (2013) found the same results with the EFL teachers in Iran. Additionally, Celik (2013, p. 478) concluded that "a shared understanding about technology's value for student learning among the EFL instructors enhances the diffusion of using Internet-assisted language resources".

Students' knowledge and skills are also cited as an influencing factor on teachers' use of ICT in their classroom practice, in direct or indirect ways. The varied levels of technical knowledge and skills of students resulted in EFL teachers' "managerial difficulty, necessitated [teachers'] guidance in autonomous learning and differentiated teaching" (Hu & McGrath, 2012, p. 160). Also when ICT is used by teachers in the classroom, this often means teachers giving students chances to use ICT to construct their own knowledge. However, if students lack knowledge and skills, they may have limited use of "high-order computer tasks" (Alharafsheh & Pandian, 2012, p. 10). As a result, the EFL teachers cannot fully use ICT in their classroom teaching.

Another student-related factor is the possibility that students provide technical assistance to their teachers in classes. Hruskocy et al. (2000, cited in Li & Walsh, 2011, p. 115) suggested that “students acting as a ‘technology expert’ in class might aid the use of ICT. In doing so, teachers need to realize that students should play an active part in the ICT use process”. In fact, a number of EFL teachers in China acknowledged that they asked for assistance from students with better technical skills and knowledge when attempting to use ICT in their classroom teaching (Hu & McGrath, 2012).

Additionally, student prior experience is identified as a factor influencing teacher use of ICT. For example, Hong and Samimy (2010) found that students who had experience in blended learning had a more positive attitude toward their teachers’ use of computers in language learning.

Finally, students’ commitment to ICT use is an influencing factor in their teachers’ use of ICT in classroom teaching. In a study with Turkish students, Ilter (2009) found that the use of computers in EFL classes was motivating for many students, and students felt committed to use ICT. As a result, they wanted their teachers to use computers more frequently and to a much greater extent in classes. Moreover, Li and Walsh (2011) claimed that one of the barriers to EFL teachers’ use of computers in classroom teaching in China is that their students were not “ready to use computers to learn” (p. 114).

#### ***2.2.6.4 Biotic factors-Technician-related factors – Prescribed roles (Rogers, 2003)***

Technicians were identified in previous research studies as influencing teachers’ use of ICT (Dinh, 2009; Hu & McGrath, 2012; Zhao et al., 2002). Often technical support provided by technicians was seen as a “key factor” (Hu & McGrath, 2012, p. 160) because this directly affected the “effective use of ICT resources” (Hu & McGrath, 2012, p. 160) and could save teachers time because they did not have to solve technical problems and could focus on their teaching (Sumi, 2010). Without timely technical

support, the EFL teachers might experience difficulties in the classroom (Shin & Son, 2007), such as losing control in classroom management (Bordbar, 2010). Without technical support, they also had to try to fix technical problems themselves, improvise the lessons by relying on their creativity and their quick-mindedness (Dinh, 2009), or have back-up lesson plans (Chambers & Bax, 2006). In fact, without adequate technical support, the EFL teachers were reluctant to use ICT in their classroom teaching (Boulter, 2007).

#### ***2.2.6.5 Biotic factors-Administrator-related factors – Prescribed roles, authority structure and rules and regulation (Rogers, 2003)***

Within a university/school context, administrator-related factors can encompass approaches to implementing technology, support and professional development (Carr, 2013). Approaches to implementing technology use in a university/school include the top-down approach and bottom-up approach. It is often reported that the top-down approach is not effective because it might cause “the teachers to feel alienated from technology” (Lam, 2000, p. 412). Yet, the top-down approach is not always considered an improper approach (Li & Walsh, 2011). For example, in some EFL contexts such as in China, it is often claimed that “school leaders and local educational authorities are important in motivating teachers to use technology in their teaching” through support and encouragement (Li & Walsh, 2011, p. 115).

What is also important is that there should be clear guidelines on ICT implementation and these guidelines should be clearly communicated with the teachers. Previous research has shown that higher chance for success of ICT integration by teachers could be achieved when teachers are provided with a clear understanding of the policies and how the policies could be translated into their practice (Tondeur, Keer, & Valcke, 2008).

Another important factor is support provided to teachers, which can take the form of financial support /continuous funding or administrative support. As noted by Chen (2008b, p. 1025)

...while funding could encourage some or more teachers to make attempts, these teachers may not expand or continue their projects when their institutions provided only minimal financial support, as teachers gave the relative value of invested time and efforts their careful consideration...

In contrast, a lack of support from school/university could result in teachers' negative perceptions in the compatibility of technology with their teaching practice and curriculum (Aydin, 2013; Bordbar, 2010). Support could take the form of administrative support (Li & Ni, 2011), for example, support to free teachers from doing administrative work when trying to use ICT (Park & Son, 2009).

With regard to professional development, Chen (2008a) emphasized that continuous professional development regarding ICT and ICT use in teachers' practice is essential so as to equip teachers with the necessary knowledge and skills to teach, especially in the era when students are considered to be technology-native. This is because even when EFL teachers believe that ICT is beneficial to their practice and even when they have positive attitude toward ICT, they would not choose to go with technology until they are certain of their competence to deliver ICT-based lessons. Moreover, professional training could enhance teachers' self-efficacy in conducting ICT-based lessons, thus ensuring continuous use of ICT by teachers in the future. For example, a teacher in Chen's (2008b) research study reported her ability to put listening materials online after attending an 8-week training course. With the training she received, she was even willing to use technology for other courses. Similarly, Parra (2012) found that after a training course on wikis, Columbian EFL teachers became more confident in their abilities to use "wikis to innovate their classes, and to meet their students' interests and needs" (p. 18). In other

words, the teachers seemed to move from “a technophobic posture” to “a technophilic position” (Parra, 2012, p. 18) after being provided with relevant professional development.

In summary, this section has reviewed research studies on the “biotic factors” (Zhao & Frank, 2003) influencing EFL teachers’ use of ICT in their classroom teaching. These factors include teacher-related factors, peer-related factors, student-related factors, technician-related factors and administrator-related factors. A number of factors could be explained in light of the Diffusion of Innovations Theory (Rogers, 2003). The following section reviews “abiotic factors” (Zhao & Frank, 2003) influencing EFL teachers’ use of ICT. Similar to the review of the biotic factors, the abiotic factors are also explored in light of the Diffusion of Innovations Theory (Rogers, 2003).

#### ***2.2.6.6 Abiotic factors – Technology-related factors***

##### **ICT relevance – Perceived relative compatibility (Rogers, 2003)**

Research has shown that the EFL teachers’ decision to use ICT in their classroom teaching only when they perceive that such use is relevant to their teaching curriculum/textbooks and teaching practice. For example, Shin and Son (2007) have found that the EFL teachers in Korea reported the need to develop Internet resources more relevant to their textbooks so as to be able to use the Internet more often. Similarly, Park and Son (2009) point out that some of the EFL teachers in their study were not willing to use ICT because not many ICT teaching resources were relevant to the classroom textbooks as these textbooks were normally designed for traditional activities with no room for ICT.



**Access to technology resources, time, ICT supporting curriculum and teaching resources easily located – Perceived complexity (Rogers, 2003)**

Access to technology resources is often cited as an influencing factor to EFL teachers' use of ICT in their classroom teaching. Having access to a computer lab when necessary is cited by a number of EFL teachers as a factor influencing their ICT use (T. X. Dang, 2014; Dinh, 2009; Li & Walsh, 2011). Having access to enough computers for students is also mentioned by EFL teachers as a factor that has a direct influence on their use of ICT. As Park and Son (2009) have argued, in a typical EFL class in Korea of about 35-40 students with one computer, the problem of not having enough computers for students reduced their learning motivations. Additionally, having access to reliable networks is important for ICT use by the EFL teachers (Dashtestani, 2012; Park & Son, 2009; Sumi, 2010) because if the network is disrupted in the middle of a class, the class might become out of the teacher's control (Shin & Son, 2007).

Time is commonly cited as an important factor affecting the EFL use of technology in classroom. To illustrate, Li and Walsh (2011) discovered that when the EFL teachers in China believed that they did not have enough time to conduct lessons with ICT, they would choose not to go with ICT although there were resources available at their schools. They claimed that "Time, both in and outside the class, is a problem" (p. 113) because they often did not have enough time for lesson preparation as well as for finishing what they were required to cover in the lesson. As a result, they did not have time to use ICT in their classes. Similarly, in their research studies with Korean EFL teachers and their use of computers, Shin and Son (2007) and Park and Son (2009) affirmed that a lack of time is the biggest obstacle to teachers' use of computers in their practice. It was very time-consuming for the teachers to search for, select instructional materials and then to adapt and find a fit for the materials in the class schedule and for their students' levels and needs. In addition, Bordbar (2010) established that insufficient time was an important

factor that prevented the Iranian EFL teachers from using computers in their classes. Also, Yang and Huang (2008) stated that Taiwanese teachers' lack of time for lesson planning and for using ICT-enhanced activities in language teaching was an impeding factor. Even with teachers who were willing to learn new tools, if they did not believe that they had enough time to conduct lessons with technology because of the teaching load, they were hesitant to invest more time in trying new instructional technology (Chen, 2008a).

A rigid curriculum/syllabus that gives no room for teachers to integrate technologies also appears to be an impeding factor. The rigid curriculum may be a prescribed national curriculum that makes the EFL teacher "hesitate to use computers" because s/he has to "follow the teaching plan and prepare for tests based on textbooks" (Park & Son, 2009, p. 91). There is also the school curriculum with allocated teaching blocks so that teachers have no flexibility to use ICT (Bordbar, 2010; Dashtestani, 2012). It is, therefore, important to have a curriculum that supports ICT use in EFL teaching.

Finally, locating teaching resources with ICT is also an important factor that affects the EFL teachers' ICT use. Lam (2000) argues that difficulties in locating appropriate teaching materials seem to hinder English teachers' use of ICT. Similarly, Lee and Son (2006, cited in Park & Son, 2009) found that because the Korean EFL teachers could not locate relevant teaching resources with ICT, they were not willing to use ICT in their classroom teaching.

In brief, this section has reviewed research studies on the factors particularly influencing EFL teachers' use of ICT in classroom teaching, using the ecological perspective (Zhao & Frank, 2003) and Diffusion of Innovations Theory (Rogers, 2003) as an organising framework. The factors were categorised into "biotic factors" and "abiotic factors" in light of the ecological perspective (Zhao & Frank, 2003, p. 816). A number of

these factors could be theoretically explained by the Diffusion of Innovations Theory (Rogers, 2003).

The above five sections of the second part of the chapter have reviewed a considerable amount of literature relating to factors that influence teacher decision-making around ICT use, as well as influential models that seek to explain how these factors operate and relate. Doing so creates difficulties for me as the researcher in deciding which factors to include, which to omit, which to emphasise, how to categorise, how to sub-categorise (if at all), and how to offer an explanation for how they connect.

Drawing on this diverse and expansive literature, I develop a summary representation of the factors in order to guide my study. I recognise, of course, that any representation has its own flaws. In spite of this, this summary representation of factors is still useful to provide a lens to help formulate the data collection and analysis. The section below presents this summary representation.

### **2.2.7 A summary representation of factors influencing EFL teachers' use of ICT**

This section presents a summary representation of the factors influencing EFL teachers' use of ICT in their classroom teaching (see Figure 7). This figure is a compilation of previous attempts to identify and categorise factors, and a review of the factors peculiarly influencing EFL teachers' ICT use identified in previous research, organised in light of the Diffusion of Innovations Theory (Rogers, 2003) and ecological perspective (Zhao & Frank, 2003) mentioned in section 2.2.6 above.

In light of the ecological perspective (Zhao & Frank, 2003), the EFL teacher's use of ICT is influenced by biotic and abiotic factors in a university/school context. These factors concern different parties such as The Teacher-The "Innovator" (Groff & Mouza, 2008, p. 23), the teacher's Colleague-"The Peer", the Student-The "Operator" (Groff &

Mouza, 2008, p. 23), the Technician-The “Translator” (Zhao et al., 2002, p. 502 ), the Administrator, all of which are the biotic factors ; and the Technology-The “Innovation” (Groff & Mouza, 2008, p. 23), the abiotic factors. These biotic and abiotic factors interact with one another in various ways in a particular school/institution – The “Context” (Zhao et al., 2002, p. 502). A number of factors (both biotic and abiotic) could be explained by the Diffusion of Innovations Theory (Rogers, 2003).

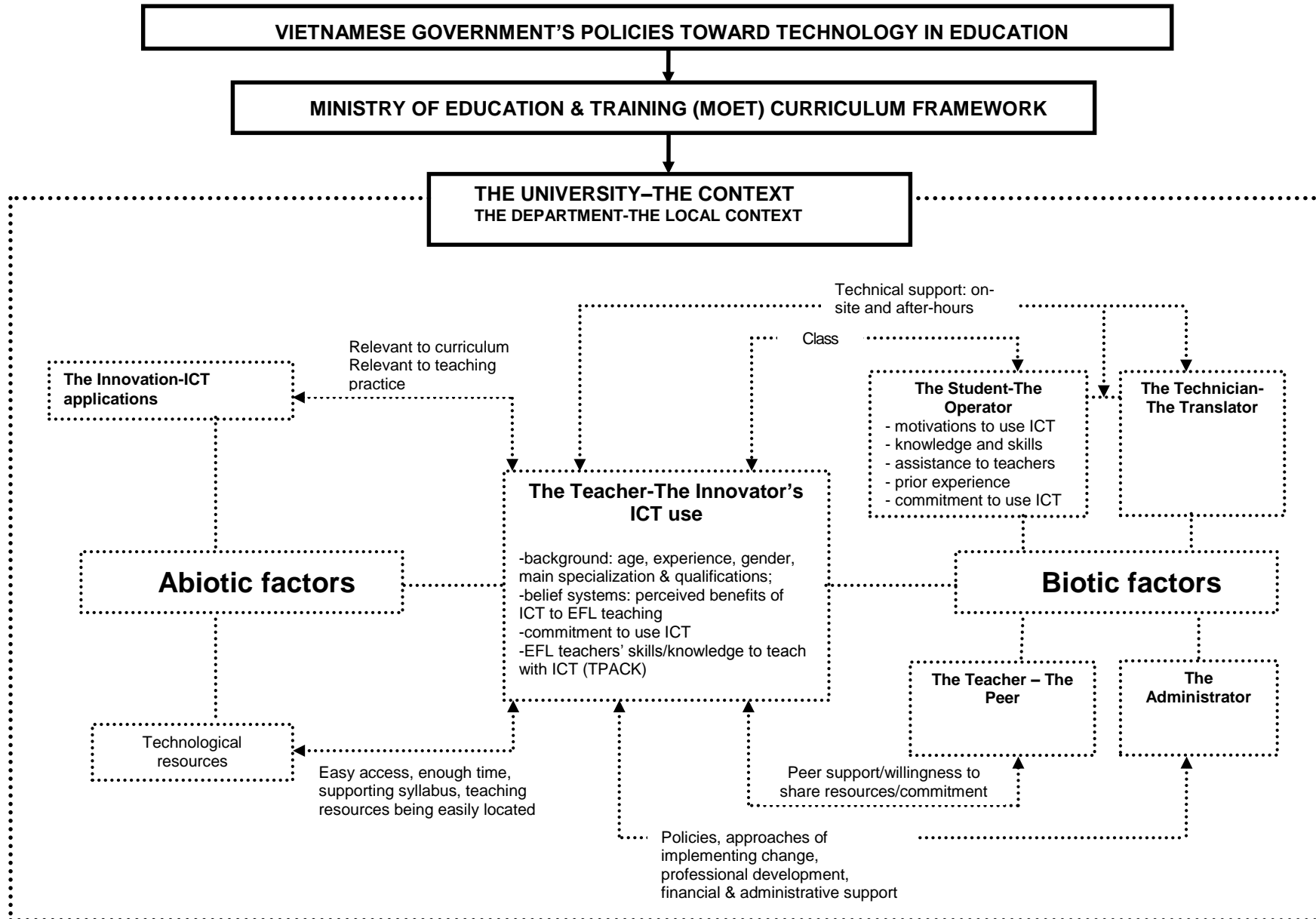
Thus, this summary representation of factors acknowledges that the factors influencing teachers’ ICT use are both biotic and abiotic factors, which interact with one another in various ways. In this representation of factors, the EFL teacher, The Innovator, is placed at the centre for a number of reasons. The first and most important reason is that it is the EFL teacher, who could make ICT-based lessons successful (Egbert, Huff, Mcneil, Preuss, & Sellen, 2009; Kern, 2006). Yet, the role of the teachers in ICT use is sometimes “overlooked in the research process” (Egbert et al., 2009, p. 755). That is why it is necessary to place an emphasis on teachers in research about ICT and English teaching and learning. The second reason has to do with the research topic – the factors influencing EFL teachers’ use of ICT in classroom practice – so it is reasonable to assume that the teachers should be the centre of the study.

This representation of factors first considers the EFL teachers’ background (*adopters’ characteristics-Rogers, 2003*) such as age, gender, teaching experience, the subject taught and highest qualification, as factors influencing their ICT use. Other factors related to the teachers are their beliefs in the benefits of ICT to EFL teaching (*relative advantage of an innovation-Rogers, 2003*), their knowledge and skills (*TPACK-Mishra & Koehler, 2006*), and commitments. During the ICT use process, the EFL teacher-The Innovator come into interaction with their Colleague-the Peer through channels such as peer support/willingness to share resources/commitment (*observability of an innovation-*

Rogers, 2003). With the Student-The Operator in a class, students' motivations to use ICT, technical knowledge and skills, technical assistance, prior experience and commitments are also considered influencing factors. The Teacher (Innovator) also interacts with the Technician-The Translator through technical support (on-site and after-hours), with the Administrator through policies, approaches to implementing change, professional development and support (*prescribed roles, regulations and authority structure- Rogers, 2003*). The Teacher (Innovator) also comes into contact with the Technology-The Innovation through such channels as their perceptions about the relevance of the technology to the curriculum and their teaching practice (*compatibility of an innovation, Rogers, 2003*), and their perceptions about the complexity of using technology in teaching, including easy access to technological resources, enough time, supporting ICT syllabus and teaching resources easily located (*complexity of an innovation-Rogers, 2003*). These are all abiotic factors.

Finally, in light of the ecological perspective (Zhao & Frank, 2003) that acknowledges the importance of ICT-related policies, this framework is placed in the Context of a Vietnamese university where the Ministry of Education and Training (MOET) policies and curriculum framework governs the university's curriculum and thus affects the teachers' ICT use. At the top level, the Vietnamese government's policies towards ICT integration into education inform the MOET's curriculum and policies accordingly. This summary representation of factors influencing teacher use of ICT will be used in this study as a lens to look at the factors, as well as for constructing data collection instruments and for data analysis (see Chapters Three and Five for more information).

Figure 7 A summary representation of factors influencing EFL teachers' ICT use in classroom teaching in Vietnamese higher education



## 2.3 Chapter summary

This chapter has reviewed ICT applications commonly employed by EFL teachers in classroom practice using a modular approach (Levy, 2009). In doing so, it has argued that research studies have pointed out that, generally, EFL teachers are using common ICT applications as a tool to support their teaching practice.

The chapter has also presented a review of previous research attempts to identify and categorise the factors influencing teacher use of ICT in classroom teaching as barriers and enablers and in other ways. In doing so, it has argued there are some issues with this categorisation of factors. This part of the chapter has also argued that teachers' knowledge and skills, informed by the TPACK framework (Mishra & Koehler, 2006), could be a factor influencing teacher use of ICT. Thus, it has provided detailed information on the TPACK framework and its influence on current research. It has then used the TPACK framework to define the seven constructs of knowledge that an EFL teacher needs to have to be able to teach using ICT. In doing so, it has recognised that there are a number of issues facing this TPACK framework. Finally, the chapter has also provided information on the Diffusion of Innovations Theory (Rogers, 2003) and on the ecological perspective (Zhao & Frank, 2003), which could offer a perspective on teachers' decision-making in relation to ICT use and on how the factors influencing this decision-making relate and operate. Using the theories as organising framework, this chapter has reviewed previous studies on factors particularly influencing the EFL teachers' ICT use. Drawing upon previous studies, the chapter presents a summary representation of the factors influencing EFL teachers' ICT use in their classroom practice, which can be used to provide a lens to help the data collection and analysis of this study.

## Chapter Three: Research Methodology

*We currently are in a three methodological or research paradigm world, with quantitative, qualitative and mixed methods research all thriving and coexisting.*

*(Johnson, Onwuegbuzie & Turner, 2007, p. 117)*

Chapter Three describes the research methodology of this study and is divided into three main parts. The first part explores the research questions, the researcher's pragmatic world-view and the decision to select a mixed methods approach as a blueprint for the study. The second part describes the selection of the research setting and participants. In the third part, the data collection methods are described, including the use of a questionnaire and semi-structured interviews. Also in this part, data analysis methods including descriptive statistics, correlational statistics, factor analysis and analytical coding are described, followed by a discussion on the reliability and validity in data collection and analysis, as well as ethical considerations. A summary then concludes the chapter.

### **3.1 A mixed methods approach**

#### **3.1.1 Research questions**

As discussed in Chapter One, the introductory chapter, the study is guided by the following research questions. In relation to the EFL teachers' perspectives:

1. Which ICT applications do they use in their classroom practice?
2. What is the impact of particular factors on their use of ICT in their classroom practice, including teachers' TPACK?
3. What is the relationship between their age, gender, teaching experience (years and specialization) and qualifications and
  - a. ICT applications used in classroom practice



b. factors influencing ICT use, including teachers' TPACK

### **3.1.2 Researcher's pragmatic worldview**

Any study is broadly influenced by the researcher's worldview or "a way of looking at the world" (Mertens, 2005, p. 7). This worldview is "composed of beliefs and assumptions about knowledge that informs [his/her] study" (Creswell & Plano-Clark, 2011, p. 39) and tends to "guide and direct thinking and action" (Mertens, 2005, p. 7).

In this study, I take a pragmatic view, that is, I make methodological decisions that enable me to research what is of significance to me (Teddlie & Tashakkori, 2009). Pragmatists insist that a "methodology is chosen for its aptness for answering the research question posed" (Glogowska, 2011, p. 52) and whether it can help the researcher achieve the research purposes (Mertens, 2005). Often, a pragmatic orientation "is typically associated with mixed methods research" (Creswell & Plano-Clark, 2011, p. 41) as was the case in this study. One of the reasons that I decided to conduct this study was that I wished to obtain a rich understanding of the EFL teachers' ICT use at Hanoi University. Therefore, I made the decision to collect both quantitative and qualitative data in order to address my specific questions. Further details on the selection of a mixed methods approach are discussed below.

### **3.1.3 Selection of mixed methods approach: triangulation purpose with convergent design**

As argued by a number of researchers, mixed methods can provide "more comprehensive evidence for studying a problem [than] either quantitative or qualitative research alone" (Creswell & Plano-Clark, 2011, p. 12). In this study, a quantitative questionnaire was designed to gauge quantifiable information about use of ICT applications, the impact of particular factors on ICT use, and TPACK. A qualitative semi-structured interview schedule was used to gain insight into experience and practice.

The use of multiple sources of data collection can also serve the purpose of triangulation (Denzin, 1989; Mertens, 2005; Williamson, 2005), thus helping to enhance the validity of a study. In this study, Denzin's (1989) conceptualization of "between-method triangulation" (p. 244) was used. For this type of triangulation, the purpose was not to achieve identical findings because "the perspectives and theoretical assumptions behind the methods differ" (Williamson, 2005, p. 9). Instead, this type of triangulation was used as a strategy for "deepening the analysis in studies" (Williamson, 2005, p. 10).

For mixed-methods studies, besides considering the purpose for mixing (such as for between-methods triangulation as discussed above), another key decision a researcher has to make is where to mix (Creswell, 2009; Creswell & Plano-Clark, 2011; Teddlie & Tashakkori, 2009). Fetters, Curry and Creswell (2013) suggested that mixing or "integration" (p. 2134) as they name it could happen at three levels, i.e., at the research design level, at the methods level and at the interpretation and reporting level.

At the research design level, this study followed a "convergent design" (Fetters et al., 2013, p. 2136), which means that after the data collection of one strand, data analysis from this strand did not inform the data collection from the other strand. Thus, while the questionnaire data was collected first, analysis was used to answer the research questions, not to inform the later collection of interview data. Interview data was likewise analysed to provide answers to the research questions.

Next, integration at the methods level happened through "connecting ...when one type of data links with the other through the sampling frame" (Fetters et al., 2013, p. 2139). Specifically in this study, the participants completed the questionnaire first, and then indicated whether they would like to participate further in interviews. However, the study followed a convergent design as discussed above.

Finally, integration happened at the “interpreting and reporting level through narrative” (Fetters et al., 2013, p. 2142), that is, data from the questionnaire and interviews were analysed separately, then mixed at the interpretation stage through narrative. The details of the decision made in relation to the data collection and analyses are explored in later sections in this chapter.

### **3.2 Selection of research setting**

This study was conducted at Hanoi University in the capital city of Vietnam. I chose this setting for three main reasons. First, as mentioned in the Introduction chapter, I had personal involvement and research interest in EFL teachers’ use of ICT in classroom practice, as I had been working as an EFL teacher at the university for eight years before commencing my PhD. Second, I knew that the university has always welcomed research, and so it would perhaps be easier for me to gain permission from the Vice-Chancellor and the Deans to conduct my study. Finally, I also thought that with support from the university, finding possible participants for my study would be facilitated.

Yet, I recognised that one of the disadvantages of basing my study in my own institution was the possible bias that I could bring to my study as an insider. Being particularly conscious of this possibility, I took a number of steps to minimise its impact. Thus, for example, I ensured that the questionnaire was completed anonymously, so as to remove the possibility of my being able to identify participants. Also, I asked participants to member check (Mertens, 2005) the transcribed semi-structured interviews to ensure reliability. Specifically, after being transcribed, the interview transcripts were sent back to the teacher interviewees to seek their general comments on the “accuracy of the account” (Creswell & Miller, 2000, p. 127).

### 3.2.1 Hanoi University

What follows is an introduction to Hanoi University, the context for this research.

Originally established in 1959, it is a state-run university located in Hanoi, the capital of Vietnam (Dang, Nicholas, & Lewis, 2012). Nowadays, Hanoi University is a “prestigious training institution” (Dang et al., 2012, p. 2) and is one of the main providers of the country’s EFL teachers, interpreters and translators. There are currently 15 departments to teach tertiary students foreign languages, with each department name reflecting the language taught there (Dang et al., 2012). For example, the English Department offers courses in English language and linguistics for English majors, who will become EFL teachers, interpreters and translators after graduation.

Since 2000, the university has opened six new departments in Business Administration, Tourism, International Studies, Computer Science, Finance and Banking and Accounting in an effort to “capitalise on its traditional strength in foreign languages” (Ta & Winter, 2010, p. 157), with training programs in these departments being taught in English.

In terms of ICT use in EFL teaching, while technological devices, such as cassette players, video players, overhead projectors, and recorders have been employed at the university for a long time, the first effort to apply computer technology was made in 2004, when the courseware *English Discovery* and later *English Discovery Online (EDO)* was purchased. This courseware has since been included into all first and second year courses.

Since this early effort to use technological tools, the university has invested in developing ICT facilities for language teaching with loans from the World Bank and from other sources (X. T. Dang, 2012). To date, 15 Internet-connected computer labs and 18 language labs, which house nearly 1,000 desktop computers, have been provided. There

is also a high concentration of desktop computers in the library, as well as about 45 projectors, installed in different rooms in different buildings (X. T. Dang, 2012).

The university has also invested in technical support with 15 technicians based at the Information Technology Centre, the university library, the Technical Centre and the International Education Centre (B. H. Tang, personal communication). The technical staff are responsible for providing technical support and consultation for the university administrators, teachers and students.

While Hanoi University has a long history in EFL teaching and has invested in ICT application in EFL, most attention has been paid to purchasing software packages and investing in infrastructure and not to teacher professional learning. As raised in Chapter One and Chapter Two, the mere purchase of hardware and software is not synonymous with teachers' use of ICT in their classroom teaching. Teachers' ICT use is a complex process that is affected by many factors.

### **3.2.2 The English Department and the Foundation Studies Department**

The English Department and the Foundation Studies Department were particularly pertinent to this study because participants for this study were drawn from them. These two departments are described in further detail in the subsequent sections.

The English Department is concerned with preparing students to become teachers of English, interpreters or translators upon graduation. The English Department was officially founded in 1967 and has developed into the largest department at the university. Of the university's 6,000 full-time regular students, approximately 1,800 are students in this department (English Department Website, 2013). In line with its training focus, it has five teaching divisions: Language Skills Division, English Literature, Interpretation and Translation, Language Theories and English Culture Divisions (English Department

Website, 2013). In this study, the teachers from all five divisions are referred to as EFL teachers. To be admitted to the English Department, students need to pass the National University Entrance Exam. They then participate in programs to enhance their language skills of listening, speaking, reading and writing in the first two years of their four-year training course, which are delivered by the Language Skills Division. There are approximately 20 students in a class. In the remaining two years, students attend regular lectures and tutorial sessions carried out by teachers from the English Literature, Language Theories and Culture Divisions, as well as classes and lab sessions to develop their interpretation and translation skills conducted by teachers from the Interpretation and Translation Division (English Department Syllabus, 2013).

In 2005, a new department, the Foundation Studies Department, was established to provide a one-year English training course for students in the six new departments. At the end of the course, the students sit an International English Language Testing System (IELTS)-style examination and on achieving a score of at least 5.5 are able to proceed to their major courses in their nominated departments. At the Foundation Studies Department, students are provided with training to develop their four language skills (listening, speaking, reading and writing ) together with IELTS test-taking skills and research skills (Foundation Studies Department website, 2013). There are three main Divisions in the Department, which are GET (General English Training) and BEL (Basic English Language) Division, EAP (English for Academic Purposes) Division and ESP (English for Specific Purposes) Division. All the teachers from the three divisions in this department were also referred to as EFL teachers in this study.

### **3.2.3 Gaining access to this setting**

Gaining access to this setting required me firstly to officially approach the Vice-Chancellor for permission to conduct this research. Through the university internal email

system, I sent an email, attaching the Explanatory Statement (Appendix 2), which outlined this study and its aims. Upon receiving the permission from the Vice-Chancellor, I contacted the Deans of the English Department and Foundation Studies Department, again attaching the Explanatory Statement, and sought their permission to conduct this study in their departments. On receiving this permission, I then focused attention on gaining access to an ethics clearance from RMIT University and to participants at this site. It should be noted that obtaining a permission to conduct my study at Hanoi University was a requirement in applying for an ethics approval from RMIT University.

### **3.2.4 Selection of participants and sampling strategies**

After gaining permission to conduct the study from the Vice-Chancellor and the Deans of the two departments (Appendices 3, 4, 5), I applied for an ethics clearance from RMIT College Human Ethics Advisory Network (CHEAN). After receiving the ethics clearance from the RMIT CHEAN in August 2012 (Appendix 1), I looked at recruiting participants. From the outset, I wanted to develop a detailed picture of EFL teachers' practice at Hanoi University. However, as I was planning to collect data from a questionnaire and an interview, I expected that the number of participants contributing data to each method would vary. For example, I wanted to collect self-report data from the questionnaire from as many of the 140 EFL teachers as possible. I then wanted to interview a smaller number of participants to gain more insight into their perceptions and practices. According to Creswell and Plano-Clark (2011, p. 183), this decision is a "good option" in terms of sample sizes in mixed-methods research, as it can enable a "rigorous quantitative examination" and an "in-depth qualitative exploration of the topic".

As mentioned above, I wanted to collect questionnaire data from as many as of the 140 EFL teachers as possible, who were working at the English Department and Foundation Studies Department of Hanoi University at the time of the study. The EFL teachers were

chosen “because they [were] readily available” (Mertens, 2005, p. 322). As a result, “convenient sampling” (Mertens, 2005, p. 322) was selected as a strategy for recruiting participants to answer the questionnaire. In doing so, I acknowledged that this is “the limitation of the sample, so [I would] not attempt to generalise the results beyond the given population pool” (Mertens, 2005, p. 322). Some 81 completed questionnaires were returned, showing a rate of return of 57.85%.

Initially, I placed an advertisement on the staff noticeboard about the study and then attended staff meetings and other events to speak about it. In Vietnam on 20 November, there is always a National Teachers’ Day, which is referred to as ‘Teachers’ Festive Day’. The English and Foundation Studies Departments always organise staff meetings, events or workshops to celebrate this day. I attended these meetings/events and workshops and spoke about my study. I took along copies of the Plain Language Statement, which outlined the study and the expectations for participation. I also took along hard copies of the questionnaire package, including the Plain Language Statement and the questionnaire in English in an envelope, and gave them out to those who requested it. I also attended the staffroom during break-time to speak about the study. Similar to what I did at the staff meetings or events, I took along copies of the Plain Language Statement, and hard copies of the questionnaire package, and gave them out to those who were interested. I also left a number of questionnaire packages in the staffroom.

A number of teachers agreed to take part in the study ‘on the spot’ and returned the completed questionnaire at the end of meetings/events or breaks in teaching. Others took the self-report questionnaire home to complete. A number were returned to me, and the remainder to the administrative officers of the two departments.

Some 140 self-report questionnaire packages were given out, of which 81 completed questionnaire were returned. The valid return rate was 57.85%, which was considered



good for analysis and reporting (Babbie, 2008). However, as discussed later in this study, the sample size is small for certain statistical techniques such as exploratory factor analysis, and is acknowledged as a limitation in this study.

As part of the questionnaire, participants were asked to indicate if they wished to be further involved in this research study by participating in an interview. This is again convenient sampling as I “included people who [were] volunteer[s] ... and [were] willing to participate in the research study” (Johnson & Christensen, 2008, p. 238). Seven teachers agreed to take part in interviews, six of whom were female teachers, one was a male teacher. Their ages ranged from 24 to 45. Thus, the number of questionnaires returned was 81 out of around 140, and seven semi-structured interviews were conducted with the EFL teachers.

### **3.3 Data collection and analysis**

Researchers often suggest that there are a number of considerations around data collection and analysis in a mixed-methods approach that need to be attended to (Creswell, 2009; Creswell & Plano-Clark, 2011; Leech & Onwuegbuzie, 2009; Morse & Niehaus, 2009; Teddlie & Tashakkori, 2009). One consideration is “timing” (Creswell & Plano-Clark, 2011, p. 65), that is, to consider when to collect and analyse different data sets. Secondly, researchers suggest considering the “weight given to quantitative and qualitative research of a particular study” (Creswell, 2009, p. 206) or “priority” (Creswell & Plano-Clark, 2011, p. 65) or “emphasis of approaches” (Leech & Onwuegbuzie, 2009, p. 64) or “priority of methodological approach” (Teddlie & Tashakkori, 2009, p. 141). In light of this, they suggest there are three possible options: equal status quantitative/qualitative or quantitative-orientated or qualitative-orientated. A third criterion is the “level of interaction” (Creswell & Plano-Clark, 2011, p. 64) or “level of mixing” (Leech & Onwuegbuzie, 2009, p. 64), which refers to the level of dependence

between the quantitative and qualitative strands. Last, the “purpose for mixing” (Leech & Onwuegbuzie, 2009, p. 63) or “functions of the research study” (Teddlie & Tashakkori, 2009, p. 141) should be considered.

In this study, the following decisions were made:

- Timing: data were collected at different times but analysed at the same time,
- Weight: equal importance was given to each set of data,
- Interaction: the collection of quantitative and qualitative data were dependent, but their analysis was separate,
- Purpose: for between-method triangulation to gain a holistic picture.

To reiterate, quantitative and qualitative data were collected in sequence. Both data sets were then analysed separately and mixed at the interpretation stage, using the research questions as an organising framework. The questionnaire data was entered into the Statistical Package for the Social Sciences Software (SPSS) version 21 and analysed to obtain descriptive statistics (percentages, mean score-M, and standard deviation-SD) and correlational statistics (Spearman Rhos). Exploratory factor analysis was also conducted to identify associations among the items and to reduce the number of items, thus making it easier to examine the relationships via Spearman Rhos. Meanwhile, data from the interviews were coded into themes. Quantitative and qualitative data were then mixed for interpretation to show an insight of the EFL teachers’ ICT use in their classroom practice at Hanoi University, Vietnam.

A detailed discussion of the data collection and analysis methods follows. For readers’ convenience, the data collection and analysis are presented separately while in practice, they were interconnected.

### 3.3.1 Data collection

The data-gathering methods employed in this mixed-methods study were:

- a quantitative questionnaire administered to all 140 EFL teachers from the English Department and Foundation Studies Department with 81 completed questionnaires being returned, and
- qualitative semi-structured interviews with seven EFL teachers from the two departments,

Further details of each of these data collection measures are described below.

#### 3.3.1.1 Choice of questionnaire

The choice of a self-report questionnaire was made in relation to the nature of this research study. As Gay and Airasia (2003) suggest, questionnaire research is relevant to descriptive research, especially educational research, which is “concerned with assessing attitudes, opinions, preferences, demographics, practices and procedures” (p. 277). This study meets these two aspects; it was conducted in an educational setting, and while it is a mixed-methods study with a correlational element, its nature is descriptive. Also, I chose to use a questionnaire to collect data because it could help reduce my influence on the study. Thus, the questionnaire served the purpose of maintaining my “etic perspective, i.e, maintaining a distance from the native point of view in the interest of achieving more objectivity” (Babbie, 2008, p. 319) because I was the participants’ colleague.

Developing the questionnaire involved several stages. In the first stage, I used the research literature to develop “the scales” (Creswell, 2009, p. 50) that would be measured. First, the *demography scale* was developed from the existing literature on the relationships between different demographic features and teachers’ use of ICT. Second, *the scale of ICT applications in EFL teaching* was based mainly on the review of ICT

applications in English teaching by Stockwell (2007) and Levy (2009). Third, *the scale of the factors influencing EFL teachers' use of ICT* was framed by the summary representation of the factors in light of the Diffusion of Innovations Theory (Rogers, 2003) and the ecological perspective (Zhao & Frank, 2003), as presented in Chapter Two. Last, *the scale of teachers' TPACK* was developed from definitions of the seven TPACK constructs (Mishra & Koehler, 2006), and from the existing literature in relation to English teachers' knowledge and ICT (such as Chapelle, 2009; Compton, 2009; Murray & Christinson, 2010) (see Section 2.2.3, Chapter Two). I decided against using the TPACK instruments already in existence as I felt there was a need to clearly define each TPACK domain for an EFL teacher as discussed in Chapter Two. Another reason was that there were issues with validity and reliability of existing questionnaire instruments to measure teachers' TPACK, including the most popular one by Schmidt et al., (2009). This can be seen in concern expressed by Koehler et al. (2012) that 90% of the research studies on TPACK published from 2006 to 2012 did not explicitly address the validity of the instruments, and about 69% of the research studies did not address the reliability of the instruments. As well, the survey tool to measure teachers' TPACK developed by Schmidt et al. (2009) (including Mishra and Koehler, the theorists of TPACK) faced similar issues in validity and reliability (Jordan, 2014). This was because this tool was validated with a small sample - only 124 pre-service teachers taking an introductory technology course. As a result, the internal reliability was obtained for items that belonged to each component of the TPACK, instead of all seven components (Abbitt, 2011). Consequently, Schmidt et al. (2009) cautioned about the use of the survey tool for other subjects without further checking for validity and reliability of the tool for those subjects.

In the second stage, I decided on the type of scale. For the first section of the questionnaire around demographic information, I used a nominal scale, which “simply represents qualitative differences in the variable measured” (Gravetter & Forzano, 2009, p. 86). Participants were required to write a number to answer questions about their total number of years of teaching experience and their ages, and tick the appropriate boxes for questions about their gender, main area of specialization and highest academic degree.

For the remaining three sections (the scale of ICT applications in EFL teaching, the scale of the factors affecting EFL teachers’ use of ICT, and the scale of teachers’ TPACK), I used an ordinal scale. Ordinal scales normally have items arranged in sequence (Gravetter & Forzano, 2009, p. 86). I chose to use a four-point scale for each of these sections, and not a five-point scale with Neutral choice so as to avoid the possibility that the participants might automatically choose this alternative without reading the questionnaire items carefully, which might result in invalid answers (Cohen, Manion, & Morrison, 2011).

For the part around EFL teachers’ frequency of using ICT applications in EFL teaching, I used the scale: Never-1, Rarely-2, Sometimes-3 and Often-4. For the impact of listed factors on their use of ICT, I used the scale: No Impact-1, Low Impact-2, Moderate Impact-3 and High Impact-4; and for teachers’ amount of TPACK, I used the scale: Not at all-1, Little-2, Moderate-3 and Much-4.

In summary, the questionnaire (Appendix 6) had four sections. The first section, demographic information used a nominal scale to ask participants to identify their gender, main area of specialization, highest qualification, age and years of teaching experience. Section 2, 3 and 4 used ordinal scales. The second section focused on EFL teachers’ use of ICT applications. Participants were asked to indicate how frequently they used each of 10 applications on a four-point scale. The third section asked participants to identify the

level of impact from a list of 28 factors, using a four-point scale. The last section focused explicitly on the amount of TPACK, which has been identified in research as having relationships with teacher decision-making. This section required the participants to identify the amount of TPACK from 25 items belonging to seven TPACK domains defined in the relation to the EFL teachers (see section 2.2.3, Chapter Two), using a four-point scale. These items were 3 CK items, 5 PK items, 3 PCK items, 3 TK items, 3 TCK items, 5 TPK items and 3 TPACK items.

The questionnaire was written (published) in the English language and the participants were required to complete the questionnaire in English. I assumed that because the respondents were EFL teachers, they were capable of understanding the English content of the questionnaire. Moreover, because most of the items were close-ended (except for two questions about the respondents' age and number of years of teaching experience where they were required to put in a number), it was assumed there was not a high level of difficulty. Therefore, there was no need for the questionnaire to be translated into Vietnamese, and then later back-translated into English, which may have affected the original ideas/purpose of the questionnaire (Mertens, 2005).

One of the disadvantages of a questionnaire with only close-ended items is that it does not give the respondents a chance to "give answers that correspond more closely with their own experience" (Minichiello, Aroni, & Hays, 2008, p. 49). As ICT use was the EFL teachers' experience, a qualitative interview was selected so that I could hear their personal voice, and take on the "emic perspective, i.e, the point of view of those being studied" (Babbie, 2008, p. 319), thus achieving a more detailed account of the EFL teachers' experience of ICT use. This is discussed below.

### *3.3.1.2 Choice of semi-structured interviews*

The qualitative interviews concentrated on “the depth” (Patton, 2002, p. 227) of information (detailed and rich data), in contrast to the quantitative questionnaire, which focused on “the breadth” (Patton, 2002, p. 227) of information (information obtained from a large number of respondents in a limited period of time).

In terms of the interview approach, I chose the “standardized, open-ended approach” (Patton, 2002, p. 346), or “semi-structured interview” (Minichiello et al., 2008, p. 52). With this type of interview, the researcher uses pre-determined questions but still has the freedom to adjust the question wording and order, so as to obtain the best data available from participants (Minichiello et al., 2008).

I came up with a number of open-ended questions to help me develop a much more personal perspective on EFL teachers’ implementation of ICT. The first question was around the perceived benefits of using ICT in the classroom. This was followed by six questions that asked them about the influence of particular factors (such as teachers, students, their colleagues, the university technicians, administrators and policies) on their practice. The second last question asked participants to describe the influence of their knowledge and skills on their use of ICT (TPACK). The final question asked them to give an example of using ICT in the classroom. A copy of the interview questions is presented in Appendix 8.

The interviews were conducted in the Vietnamese language because I believed this would make the interviewees feel more comfortable in answering the questions and, therefore, help to keep the conversation flowing smoothly and thus a richer account of information was more likely to be obtained. However, as said above, in practice I needed to adapt these questions, and rephrase as necessary in order to make the conversation flow smoothly and logically, while still obtaining “systematic and comprehensive data”

(Minichiello et al., 2008, p. 52) in relation to the research questions. All seven interviews lasted for about 30 minutes and were audio-recorded. During the interviews, I also made notes on important points raised by the interviewees.

### **3.3.2 Data analysis methods**

In line with the design of the research, the analytical procedures for mixed data analysis by Johnson and Christensen (2008, p. 555) were employed. This analysis was framed by the research questions (Onwuegbuzie & Leech, 2006), two of which (questions one and two) were constructed in a “parallel” way (Creswell & Plano-Clark, 2011, p. 184), i.e., to address the same concepts. In the following paragraphs, I discuss how I analysed the data in relation to each of the methods used.

#### **3.3.2.1 Questionnaire**

Quantitative data analysis was conducted in the light of the research questions. In other words, the quantification of data was used to explore EFL teachers’ (n=81) self-report on their use of ICT applications (first research question), their perceptions of the impact of various factors on their use of ICT including their TPACK (second research question), and the relationship between teachers’ demographic features and these aspects (third research question).

I used the SPSS software version 21 to analyse data. In order to prepare and analyse data properly, I consulted with a statistical expert at RMIT University in addition to regular meetings with my supervisors. First, all data from the 81 questionnaires was entered into an SPSS file. Then the data was checked for errors to detect any “values that fall outside the range of possible values for a variable” (Pallant, 2011, p. 40). For example, for the gender variable, I assigned the code 1 for female and 2 for male. This was checked to make sure that no scores other than 1 or 2 for this variable were recorded.



Also, missing data were screened using frequency tables. These tables showed that missing data concentrated on some items such as ‘Web-based projects’ (Section 2 – ICT applications), ‘Students’ commitment to using ICT’ (Section 3 – Factors influencing teachers’ use of ICT) and ‘Teachers’ knowledge to select effective teaching strategies to guide student learning’ (Section 4 – Teachers’ TPACK). I further investigated this issue and discovered that this was caused by the misprint of these three items in some questionnaire copies.

Three alternatives for treating missing data were considered: list-wise deletion, pairwise deletion and replacing with the mean. List-wise deletion can lead to eliminating important cases and can make the sample size unnecessarily smaller (Howell, 2012). Pairwise deletion can lead to different statistics with different sample sizes, so the results may not be reliable (Howell, 2012). Replacing with mean may distort the results (Pallant, 2011). I weighed up the deletion of the variables and deletion of the cases with missing data, as well as the possibilities of having unreliable and biased results, and I chose not to use any of these alternatives. Instead, I followed the advice of Tabachnick and Fidell (1996) and dropped those three variables with concentrated missing values to retain the sample size of 81 and to avoid the loss of important data in the analysis. However, this omission is acknowledged as a limitation of this study.

The analysis of the questionnaire findings started with descriptive statistics such as percentages, mean score and standard deviation. These were obtained on the frequency of use of ICT application, on the level of impact of factors influencing EFL teachers’ use of ICT and on the teachers’ amount of TPACK to answer research questions one and two.

Next, Spearman Rho were calculated to examine the relationships between the listed factors that influenced teachers’ ICT use and their use of ICT applications, as well as between teachers’ TPACK and their use of ICT applications. Spearman Rho were used

because the demographic variables and frequency of ICT use, level of impact of influencing factors and amount of TPACK were not continuous variables in this study (Field, 2013; Pallant, 2011).

Before Spearman Rhos were calculated, exploratory factor analysis was run to reduce the number of items in the questionnaire, thus making it easier to explore the relationships (if any). Factor analysis is a group of techniques that can be used to “reduce a data set to a more manageable size while retaining as much of the original information as possible” (Field, 2013, p. 666). I decided that while there was extensive literature around the use of ICT applications in language instruction, factors influencing teachers’ use of ICT and teachers’ TPACK, little had been established about the relationships among these variables in the context of Vietnam’s higher education. Factor analysis was, therefore, selected as a means to explore possible relationships among ICT applications, factors influencing EFL teachers’ use of ICT and TPACK domains.

The sample size was 81 EFL teachers. This is considered small for factor analysis (Comrey & Lee, 1992), and I recognise that this is a limitation in my study. However, given that the population size was approximately 140, a sample size of 81 was a good rate of return. Moreover, as this is a study of Hanoi University where the EFL teachers used ICT in their instruction, this study was not concerned with “statistical generalisation from a sample to a population” (Cohen et al., 2011, p. 294). Instead, Hanoi University might be of importance “to catch significant features” (Cohen et al., 2011, p. 295) that might be present in other universities in Vietnam for ICT use. Finally, as the purpose of the study was to gain insight into EFL teachers’ ICT use in Hanoi University, it used a combination of various sources of data from a quantitative questionnaire and qualitative interviews, rather than solely relying on the questionnaire. As such, exploratory factor analysis was performed for exploratory purposes to assist in identifying possible trends and

associations among items that made up different constructs in the questionnaire, and the “conclusions [were]... restricted to the sample” only (Field, 2013, p. 674).

Finally, Spearman Rhos were also calculated to investigate relationships between the EFL teachers’ demographic features such as gender, years of teaching, age, main area of specialization and highest qualification and 1) their use of ICT applications, 2) their perceptions of the impact of the factors influencing their ICT implementation and 3) their TPACK. This was done to answer research question three.

### ***3.3.2.2 Interviews***

Qualitative data analysis was also conducted in light of the research questions. The data obtained from semi-structured interviews with the seven teachers were transcribed verbatim and coded through “topic coding” and “analytical coding” (Richards, 2005, p. 88). This process involved reading the transcripts carefully, and assigning “passage to topics or themes” (Richards, 2005, p. 92). For example, while reading the transcripts, if I saw the word “benefits of ICT” or “ICT is beneficial” or “ICT can help” in a passage, I would write “ICT benefits” in the margin. Then I created a table into which I cut and pasted all the passages with the same topic and organised them under the name of the topic. Next, I revisited the table and created “categories that express new ideas about the data” (Richards, 2005, p. 94). I then determined a name for the categories next to the passages in the margin. Then, a hierarchy of these categories was determined (Johnson & Christensen, 2008). Where necessary, I translated from Vietnamese into English those quotes from interviews that were of use for data analysis. These English translations were later verified by a NAATI-accredited professional translator (Appendix 11). In the end, this data was mixed with questionnaire data at the interpretation stage to provide a rich account of the EFL teachers’ use of ICT in classroom practice at Hanoi University.

### ***3.3.2.3 Strategies for merging data analysis***

As discussed above, I merged data from the questionnaire and interviews in the interpretation stage. In order to merge the data analysis, I used the strategy recommended by Fetters et al. (2013, p. 2142), which is using “narrative”. I used one approach in relation to narrative integration, the “weaving approach, [which] involves writing both qualitative and quantitative findings together on a theme-by-theme or concept-by-concept basis” (Fetters et al., 2013, p. 2142). The merging of the data analyses was organised using the research questions as an organising framework, followed by conclusions or explanations (Creswell & Plano-Clark, 2011). Thus, the integrated findings from questionnaire and interviews were organised around ICT applications, factors influencing teacher use of ICT, teacher TPACK and the relationships between teachers’ demographic features and their use of ICT, their perceptions on the impact of factors and their TPACK. One theme on the complexity in teacher use of ICT emerged from the questionnaire and interviews was also discussed. In doing so, I hoped to use the “between-method triangulation” (Denzin, 1989, p. 244) to have a rich picture on EFL teacher use of ICT in their classroom teaching at Hanoi University, Vietnam.

### **3.3.3 Reliability and validity in data collection and analysis**

It is important when designing a study to consider issues around reliability and validity in data collection and analyses. One key way to do this is to use different methods of data collection (Richards, 2005) so as to triangulate data (Creswell & Plano-Clark, 2011; Minichiello et al., 2008; Patton, 2002; Richards, 2005) as used in this study. Other ways of exploring reliability and validity with each of the measures used are explored in the paragraphs that follow.

In relation to the questionnaire, I first established face validity to see whether “the measure apparently reflects the content of the concept in question” (Bryman, 2012, p.

171). In order to do this, I asked an EFL teacher to check the questionnaire items. Feedback was then used to make some minor or surface changes to the wording and order of the items in each scale. Some overlapping items were also deleted from the questionnaire. I then piloted the questionnaire with 22 teachers from several Vietnamese higher education institutions, including some EFL teachers from Hanoi University. Responses from the pilot were “briefly analysed”, and “blank answers [were] looked for” (Mertens, 2005, p. 183).

In analysing questionnaire data, I consulted the statistician from RMIT University to check the accuracy of data entry and results. I also investigated the internal consistency of the three scales in the questionnaire, “which is the degree to which the items that make up the scale are all measuring the same underlying attribute” (Pallant, 2011, p. 6) via Cronbach’s alphas after exploratory factor analysis, which are detailed in Chapter Four of this thesis.

In terms of the semi-structured interview, I built validity into the interview questions by piloting them with two Vietnamese teachers (who were studying in Australia) to see whether they understood and interpreted the questions in the way the questions were intended. Feedback was used to make a few surface changes to the wording of the interview questions.

To establish “credibility” (Mertens, 2005, p. 254) of the data analysis, that is “the correspondence between the way the respondents actually perceive social constructs and the way the researcher portrays their viewpoints” (Mertens, 2005, p. 254), member-checks was used with interview data. Overall, there was good agreement from the respondents, so no further clarifications were needed. Also, because the interviews conducted with seven EFL teachers were in Vietnamese, all interview quotations used for

data analysis that were translated into English were audited and then verified by a NAATI-accredited professional translator (Appendix 11).

### **3.3.4 Ethical considerations**

A number of measures were put in place to ensure there was no potential harm or risks to the participants including making participation voluntary; ensuring their right to withdraw; gaining informed consent; and maintaining anonymity and confidentiality of the information obtained (Groves, Fowler, Couper, Lepkowski, Singer, & Tourangeau, 2009; Lodico, Spaulding, & Voegtle, 2010).

To begin with, I ensured that participation in this study was voluntary and that participants could withdraw at any stage of the study. The advertising flyer, the Plain Language Statement accompanied the questionnaire and the interview, as well as my own comments at staff meetings/events, reiterated that this was the case. Additionally, transcripts of the interviews were sent for member-checks (Mertens, 2005).

Informed consent was given by all participants. The questionnaire package contained both a Plain Language Statement (Appendix 7) and hard copy of the questionnaire instrument. The Plain Language Statement (Appendix 9) was given to participants who chose to further participate in this study via interview, and consent forms were signed.

To maintain anonymity, no names were recorded on the questionnaires. While some demographic data was obtained, identification of individuals was highly unlikely. To protect the participants' identities in the semi-structured interviews, pseudonyms for the EFL teachers such as Mary, Daisy, etc., were used.

In handling the data collected, the questionnaire responses and interview transcripts have been kept in a secure place at RMIT University, and will be retained for a period of

at least five years. All electronic files are stored in a password-protected computer in my research office at RMIT University.

### **3.4 Chapter summary**

This chapter has documented the researcher's worldview, research questions, and the choice of the mixed-methods approach for this study involving EFL teachers at Hanoi University in Vietnam. It has described the data-collecting instruments, namely a quantitative questionnaire administered to 81 EFL teachers and qualitative semi-structured interviews with seven teachers. The chapter also described the choice of descriptive (percentages, mean score and standard deviation), correlational statistical techniques (Spearman Rhos) and exploratory factor analysis for the questionnaire data analysis, as well as analytical coding for the data obtained from the interviews. The strategy of using a weaving approach in integrating findings through narrative has also been discussed. Issues of validity, reliability and ethics have also been considered.

In the next chapter, the Findings Chapter, I will report on the findings of this study. The organisation of the discussion is framed by the research questions. These findings will be integrated for interpretation purposes in a later chapter, Chapter Five: Discussion of Findings.

## Chapter Four: Findings

In this chapter, I present the findings of the study conducted with the EFL teachers in two departments at Hanoi University, Vietnam: the English Department and the Foundation Studies Department. These findings are presented in relation to the research questions. As I mentioned in Chapter Three, the findings were obtained via two data collecting instruments: a questionnaire administered to 81 EFL teachers and semi-structured interviews conducted with seven teachers. For ease of discussion, I report findings from each data collecting method separately. In Chapter Five, I integrate these findings to discuss them in relation to the literature. This is followed, in Chapter Six, by the conclusions and implications of this study.

### 4.1 ICT applications used

The first part of this Chapter is framed by the first research question around the ICT applications used by the EFL teachers. As discussed above, findings for this question are reported separately for each data collection method.

#### 4.1.1 Questionnaire findings around use of ICT applications

This subsection reports on the findings on the EFL teachers' use of ICT applications in teaching practice. In the questionnaire, the participants were asked to rate their frequency of using particular ICT applications in their practice on a four-point scale: *Never (1)*, *Rarely (2)*, *Sometimes (3)* and *Often (4)*. The percentages of each frequency rating of specific ICT applications were calculated. Results are reported in Table 1.



**Table 1** *Frequency of Use of ICT Applications*

<b>*N=81</b>				
<b>ICT applications</b>	<b>% Never (number count)</b>	<b>% Rarely (number count)</b>	<b>% Sometimes (number count)</b>	<b>% Often (number count)</b>
Electronic dictionaries	8.6% (7)	11.1% (9)	38.3% (31)	<b>42.0%</b> <b>(34)</b>
Power Point	6.2% (5)	14.8% (12)	43.2% (35)	<b>35.8%</b> <b>(29)</b>
Word-processor	14.8% (12)	19.8% (16)	32.1% (26)	<b>33.3%</b> <b>(27)</b>
Digitized audio-video	6.2% (5)	19.8% (16)	42.0% (34)	<b>32.1%</b> <b>(26)</b>
Tutorials and drills	11.1% (9)	21.0% (17)	46.9% (38)	21.0% (17)
Web-based activities	11.1% (9)	30.9% (25)	39.5% (32)	18.5% (15)
Word- recognition software	16.0% (13)	33.3% (27)	34.6% (28)	16.0% (13)
Voice-chat	<b>53.1%</b> <b>(43)</b>	30.9% (25)	14.8% (12)	1.2% (1)
Audio/ Video conferencing	<b>54.3%</b> <b>(44)</b>	30.9% (25)	11.1% (9)	3.7% (3)

\*Note: N=Sample size

Table 1 shows that there was a considerable variation in the EFL teachers' reported use of ICT applications. To be more specific, such applications as 'Electronic dictionaries', 'Power Point', 'Word-processor' and 'Digitized audio-video' were used by the teachers more *often* than other applications. As can be seen from the table, 'Electronic

dictionaries' were used most often by the teachers (42%), followed by 'Power Point' (35.8%), 'Word-processor' (33.3%) and 'Digitized audio-video' (32.1%).

In contrast, some other ICT applications such as 'Voice-chat' and 'Audio/Video conferencing' were reported to be *never* used by a big number of participants. As can be seen from the above table, 53.1% and 54.3% of the participants never used 'Voice chat' and 'Audio/Video conferencing' respectively.

Finally, the remaining three ICT applications, namely, 'Tutorials and drills', 'Web-based activities' and 'Word recognition software' were *never* used by around 10% of the teachers. One-fifth of the participants reported that they *rarely* used 'Tutorials and drills', and around one third *rarely* used 'Web-based activities' or 'Word recognition software'. Nearly half of the participants *sometimes* employed 'Tutorials and drills', and the numbers for 'Web-based activities' and 'Word recognition software' were about one-third. Finally, roughly the same number of participants reported that they *often* used these three applications in their teaching practice.

Thus, self-reported questionnaire findings on the use of ICT applications by the EFL teachers show that they tended to use these applications to varying frequencies. The next section turns to report interview findings around the use of ICT applications.

#### **4.1.2 Interview findings around use of ICT applications**

Interview findings on the types of ICT applications in classroom teaching mainly come from the last question in the semi-structured interview, which prompted the participants to give a typical example of using ICT applications in their teaching practice.

Generally speaking, all the seven interviewed teachers commented on employing multiple uses of ICT as a tool in their classroom teaching. For example, Helen used video as a tool for delivering content, as well as email and Skype as a tool, mainly to support

communication with students. These multiple uses of ICT applications by Helen can be shown in the comments below:

... For example, in a Speaking lesson on the topic of Cinema, I would play a movie in English for students, and my students will do follow-up activities such as reading comprehension, or listening then answering questions, the so-called comprehension questions to assess students' understanding of the movie, or group work or pair work ...

... For example in a writing class, students need teachers' feedback to their written work, and it is impossible to provide quality feedback to 25 pieces of writing at the same time in class because the total class time is only 1.5 or 3 hours. In this case, the teacher will need to use email and Skype or a chatting software to communicate with students whose work has not been marked/corrected in class.

Similar to Helen, Judy also used ICT to support the delivery of teaching content. In this case, she used a computer-connected projector and audio/video files in her teaching of English Culture:

For example in teaching Culture, I use computer and projector. I download the audio/video files on a certain topic from the Internet, and play the files for the students to listen and watch via the projector ... Most lessons are done in the room which has a computer connected projector.

Likewise, Daisy reported on the use of ICT as a tool for content delivery during her lessons, as a tool for lesson preparation, and for facilitating students' learning:

My laptop has some teaching materials shared by my colleagues, and some software to download up-to-date speeches, and if these are too fast or too difficult, I use a software to reduce the speed to make it more suitable for my students to interpret from ... I also used the control board to manage my student's activities, for example, enabling me to listen to students' interpretation work for checking, or to record their interpretation work for practicing. I could also let student listen to their recorded work and to check the work themselves.

In addition, Mark indicated his multiple uses of ICT as a tool for content delivery, for information display, and for communicating with his students. His use of ICT tended to be adapted to suit his instructional goals:

In the language lab, I use a range of ICT applications, e.g., I record talks from real conferences/seminars and play the audio files for students to interpret. This gives students a feeling of real contexts, and my students will know how the speakers in conferences speak. I also use Power Point software to display the text, because now all labs have projectors or connected to a TV, so students will feel it real. Another application is the use of email: I can send students' assessed work/assignments, or ask them to go to the Internet and search information on a certain topic for the next lesson. I would ask them to bring information to class and share with one another. This is very convenient, as we could meet one another in class and online.

Another teacher, Valerie, also commented on multiple uses of ICT such as projectors and video clips. Specifically she commented on using ICT for the purpose of information display, content delivery, and resource sharing with students. Similar to Mark, Valerie tended to appropriate her use of ICT for her instructional intents:

... For example, in a grammar lesson, I can use the projector to display correct answers, all students can see the problem, what students should fill in the blank, if it is not correct, they will have to redo. Or I can play video for the students, and play dictation file for students to write, the whole passage, or individual paragraphs, or students can send their writing tasks for me to correct. I can display one writing piece as a sample for students, in a traditional classroom I can ask one student to write on the board or to divide the board into two if that's a short writing task, but with ICT, I can ask one student to write on the board, and another to write using computers, or I could type and explain, and use colours or tables, and send them my lesson ... I think it is better if teachers both teach and explain things at the same time, so students could understand better.

Unlike the previous teachers who used ICT for delivering content, information display and communicating with their students, Mary reported her use of ICT as a motivator for students to learn English. She commented: "In a lesson, the use of ICT is not only for improving students' speaking skill, but mainly to motivate students ... Learning with projectors I know that it is an advantage, students could feel more motivated to study... because projectors can bring about audio visual effects, which makes students like the lessons better".

As can be seen from the above paragraphs, the EFL teachers in the interviews reported that they employed multiple uses of ICT as a tool for teaching purposes. However, they indicated that the use of ICT by teachers was more than that by the learners. The following quotations clearly illustrate this point:

... The use of ICT is done by teachers, rather than students. The amount of ICT used by students is not much. In a class, ICT is mainly used by teachers, not by students (Mary)

... The use of ICT in class (by teachers) is running a particular software package or using techniques to run that software package without having technical breakdowns (Valerie)

... Most of the time, it is the teacher who uses ICT for teaching (Daisy)

Also, the teachers could decide whether or not to use ICT in their classroom teaching, as commented by Valerie:

... ICT gives us a choice, but it is up to the teachers to decide whether or not to use it (Valerie).

When designing this study, I did not intend to investigate the reasons why the EFL teachers used ICT in their classroom teaching. However, some reasons were revealed by the teachers and are worthy of a brief mention.

Three main reasons were given as to why the teachers used ICT in their teaching practice. The first reason is that they were required by the university/department to do so, as shown in the comments below:

If you consider the inclusion of an hour of EDO weekly into the timetable as policies to integrate ICT into classroom teaching in the timetable, then it is the policy (Valerie).

At the university, there is EDO program for first-year and second-year students (Judy).

Another reason for teachers using ICT was because they were aware of the benefits that ICT brings to their classroom instruction, as reported by Mary and Judy:

I sometimes take my students to the projector room in the Speaking lesson although I am not officially required to do so, I want a change for my students through the use of projectors because they can practice their speaking skills through making presentation. Learning with projectors I know that it is an advantage, students could feel more motivated to study ... because projectors can bring about audio-visual effects, which make students like the lessons better. (Mary)

No one forces me to use ICT in teaching English. I have been using ICT because I see the positive impact of ICT on my teaching (Judy).

The final reason for the teachers to use ICT was because they saw the students' need, which is shown in Cindy's comments below:

For example, when I teach dictation, there is no textbook available, so teachers have to use laptops to design dictation tasks by using some software such as Editor without technical guidance provided by technicians ... Teachers have to do this and learn to do this because we see that this is necessary for students.

In summary, findings from interviews with seven EFL teachers show that they reported on multiple uses of ICT applications in their teaching practice. These ICT applications were used as a tool for different purposes, and were employed mainly by the teachers. A number of teachers stated the reasons for their ICT use, i.e., they were required by the university, they saw the benefits ICT brought to their students, and they recognised the students' needs when deciding to use ICT in their classroom practice.

## **4.2 Findings around the influence of factors**

This second part of this chapter reports on the findings around the influence of particular factors on teacher use of ICT, including teachers' TPACK. It begins by reporting on questionnaire data around influence of a set of factors, followed by findings from

interviews. Next, it moves on to report findings from the questionnaire around teacher TPACK, followed by findings from interviews.

#### **4.2.1 Questionnaire findings around influence of a set of factors**

The questionnaire section relating to the impact of factors influencing teachers' use of ICT in classroom practice used a four-point scale: *No Impact (1)*, *Little Impact (2)*, *Moderate Impact (3)* and *High Impact (4)*. The mean score (M) and standard deviation (SD) of the ratings on the impact of each factor were calculated and are presented in Table 2.

**Table 2** Mean Scores and Standard Deviations of Ratings on Impact of Factors  
on Teachers' Use of ICT

(1= No Impact, 2= Little Impact, 3= Moderate Impact, 4= High Impact)

	<b>Item (*N=81)</b>	<b>*M</b>	<b>*SD</b>
1	Teacher belief in ICT benefits	3.57	0.61
2	Student motivation to use ICT	3.28	0.71
3	ICT relevance to curriculum	3.28	0.55
4	Teacher knowledge of ICT to teach English	3.28	0.62
5	Having enough time to prepare lessons	3.27	0.65
6	ICT relevance to teaching practice	3.25	0.60
7	Teacher knowledge of where to look for support	3.21	0.65
8	Access to reliable technology	3.20	0.80
9	Access to enough computers for students	3.12	0.91
10	Having on-site technical support	3.11	0.81
11	Knowing that department has supporting syllabus	3.11	0.78
12	Access to computer lab when in need	3.07	0.83
13	Provision of teaching resources by department	3.01	0.84
14	Teaching resources easily located	2.98	0.81
15	Having access to professional development	2.96	0.87
16	Student technical knowledge	2.96	0.66
17	Knowing ICT use required by the department	2.93	0.70
18	Knowing colleagues willing to share technological resources	2.91	0.83
19	Teacher belief in students' assistance	2.90	0.78
20	Having access to clear guidelines	2.88	0.90
21	Teacher commitment to using ICT	2.84	0.62
22	Knowing colleagues will help use ICT in instruction	2.80	0.84
23	Having administrative assistance	2.79	0.82
24	Knowing colleague commitment to using ICT	2.69	0.74
25	Having after-hours technical support	2.64	0.86
26	Student prior experience	2.54	0.73
27	University financial support	2.54	1.06

\* Note: N= Sample size, M= Mean score, SD= Standard Deviation

Table 2 shows that, generally speaking, all 27 listed factors were perceived by the EFL teachers as having an impact on their use of ICT in classroom teaching (with no mean scores below 2), although the level of impact was different (with the mean scores ranging from 2.54 to 3.57, SD varied).

Of the 27 listed factors, 'Teachers' beliefs in ICT benefits to EFL teaching' was rated by the EFL teachers as having the highest mean impact on their use of ICT in classroom teaching ( $M=3.57$ ,  $SD=0.61$ ). This was followed by such factors as 'Teachers' knowledge and skills to use ICT to teach English', 'ICT relevance to curriculum' and 'Students' motivation to use ICT' (with  $M= 3.28$  for all three,  $SD=0.71$ ,  $0.55$  &  $0.62$  respectively).

Next, 'Having enough time to prepare lessons to teach with ICT', 'ICT relevance to teaching practice' and 'Teachers' knowledge of where to look for support' were indicated by the teachers to have the third highest impact on their use of ICT. The ratings for these three factors were  $M=3.27$  ( $SD=0.65$ ),  $M= 3.25$  ( $SD=0.60$ ) and  $M=3.21$  ( $SD=0.65$ ) respectively.

Moreover, such factors as 'Having access to reliable technology', 'Having enough computers for students', 'Having a supporting syllabus for ICT use' 'On-site technical support', 'Access to a computer lab when needed', and 'Provision of teaching resources by the department' received similar ratings in relation to their impact on teachers' use of ICT (with mean score being roughly around 3, although the corresponding standard deviations were different). These factors were rated as having the fourth highest impact.

A whole gamut of factors such as 'Teaching resources easily located', 'Professional development opportunities', 'Students' ICT knowledge', 'ICT use required by the department', 'Colleagues' sharing of teaching resources', 'Students' assistance', 'Clear guidelines' and 'Teachers' commitment' received roughly similar ratings with the mean score being in the range of 2.8-2.9 (with different corresponding SDs).

Finally, the factors that received the lowest rating in relation to their impact on the teachers' use of ICT were 'University financial support' ( $M=2.54$ ,  $SD=1.06$ ), and 'Students' prior experience' ( $M=2.54$ ,  $SD=0.73$ ). 'After-hours technical support' was



perceived to have the second lowest impact on teachers' use of ICT (M=2.64, SD=0.86). This was followed by 'Colleagues' commitments to using ICT' (M=2.69, SD=0.74), 'Administrative assistance' (M=2.79, SD=0.82) and 'Colleagues' help in using ICT' (M=2.80, SD=0.84).

Thus, it can be seen that the EFL teachers in this study seemed to perceive that the factors influencing their ICT use come from different sources, such as the teachers themselves, their students, their colleagues, technicians, administrators and the technology. This study has suggested that the EFL teachers thought that the factors relating to themselves as teachers tended to have the highest impact on their own use of ICT for classroom teaching. These factors included 'Teachers' beliefs in the benefits of ICT to EFL teaching' and 'Teachers' knowledge and skills to use ICT to teach English'.

Interestingly, a different pattern emerged in relation to the impact of students on teachers' use of ICT. While one factor, 'Students' motivation to use ICT', was reported as having the second highest impact, others were not rated as highly, with 'Students' prior experience' being the second lowest rating.

Likewise, factors relating to technical support were rated differently. One factor, 'On-site technical support' was rated as being in the group of factors having the fourth highest impact out of the 27 listed factors. Meanwhile, 'After-hours technical support' was reported to have the second lowest impact on teachers' use of ICT in their classroom teaching.

In relation to other forms of support, although the EFL teachers were concerned about 'Their knowledge to look for support' as this factor was rated to have the third highest impact on their use of ICT, they were not concerned about 'Financial support from the

university'. This factor was rated by the teachers to have the least impact on their use of ICT in classroom teaching.

Likewise, colleague-related factors did not have a significant impact on the teachers' use of ICT. Such factors as 'Colleagues' commitments to use ICT' and 'Colleagues' help in using ICT' were rated as having the third and fifth lowest impact.

Finally, the teachers were also concerned about technology-related factors. The factor 'ICT relevance to curriculum' was rated as being in the group of factors that had the second highest impact on their use of ICT, followed by 'Having enough time to prepare lessons', 'ICT relevance to teaching practice' and 'Having access to reliable technology'.

#### **4.2.2 Questionnaire findings on relationships between ICT use and the factors**

To obtain empirical evidence on the relationship between the EFL teachers' ICT use and the factors affecting their ICT use in classroom teaching, Spearman Rhos on the relationships were calculated. I decided to calculate Spearman Rhos because ICT applications and factors influencing teachers' ICT use were not continuous variables, and as such, non-parametric techniques were a good choice to explore possible relationships (Gravette & Wallnau, 2007; Pallant, 2011). Prior to this, I used exploratory factor analysis on ICT applications (questionnaire section two), and on Factors influencing teachers' ICT use (questionnaire section three) to reduce the number of items, thus making it easier to explore the relationships. While doing this, I noted that because the sample size of 81 was considered fairly small for factor analysis, the results obtained would be "restricted to the sample only" (Field, 2013, p. 674).

##### ***4.2.2.1 Exploratory analysis on ICT applications and Factors influencing teachers' use of ICT***

This section details exploratory factor analysis on ICT applications and Factors influencing teachers' use of ICT as a means of reducing the number of items in these

sections of the questionnaire. Before exploratory factor analysis was done, factorability of each section was checked by obtaining the KMO, Bartlett's test of sphericity and correlation matrices. According to Field (2013) and Pallant (2011), a set of data is suitable for factor analysis if KMO is  $>.5$ , and the Bartlett's Test of Sphericity is significant,  $p <.05$ . KMO and Bartlett's Tests of Sphericity were, therefore, run on the questionnaire sections on ICT applications and Factors influencing teachers' ICT use. The KMO for these two sections of the questionnaire were .622 and .718 respectively ( $>.5$ ) and the Bartlett's Test of Sphericity ( $ps$ ) were all .000 ( $<.005$ ), which suggested the suitability of these two sections for factor analysis.

Next, the correlation matrices of the questionnaire sections were examined to investigate the relationships among the items. Specifically, I looked for correlations greater than .3 because this would show the suitability of these sections for factor analysis (Field, 2013; Pallant, 2011). A number of items in the two matrices (Appendix 12A and 12B) had correlations greater than .3, further confirming the suitability of these sections for factor analysis.

Following the checks around the suitability of the data for factor analysis, I then made a number of decisions in regards to exploratory factor analysis. First, I decided on the extraction method I would use. I employed Principal Components Analysis (PCA) because researchers such as Costello and Osborne (2005) argue that it is the most popular method for factor extraction.

Then I moved to deciding on the rotation method. According to Schmitt (2011), there are two popular rotation approaches: oblique rotation and orthogonal rotation. Of these two approaches, oblique rotation "generally results in more realistic and more statistically sound factor structure" [than orthogonal rotation] (Schmitt, 2011, p. 312). Furthermore, Direct Oblimin, one method of oblique rotation, assumes that the factors are dependent on

one another, in other words, they might correlate (Field, 2013, p. 681). As I could not assume the factors to be independent, Direct Oblimin seemed to be an appropriate method of choice.

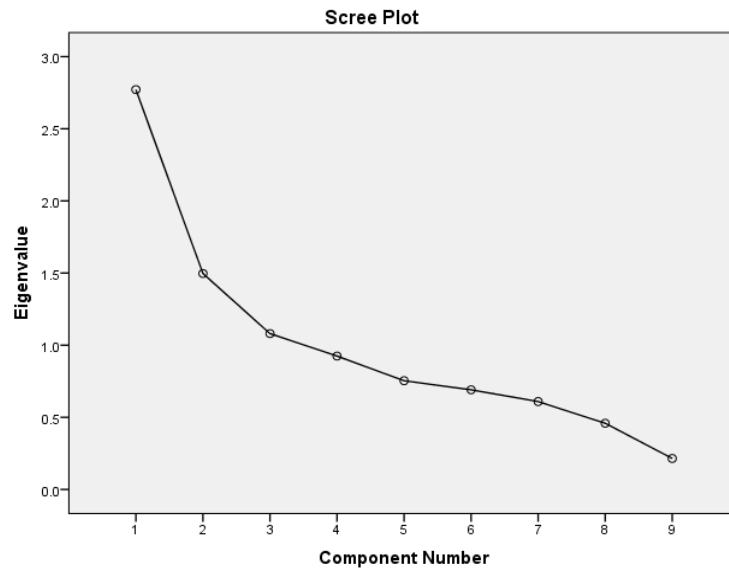
I then decided on the interpretation method to determine how many factors were retained. This is also very important. As suggested by Costello and Osborne (2005), scree tests are commonly used to decide the number of factors. After the Eigen values were calculated, they were plotted along a scree test. The point before the line started to level off was then used to help me decide on the number of factors to retain (Costello & Osborne, 2005; Field, 2013; Pallant, 2011). As the sample size was below 100, the Parallel Test as suggested by Costello and Osborne (2005) and Pallant (2011) was not used.

Finally, I considered the factor loading. Normally, researchers suggest that loadings which are .3 can be considered significant (Pallant, 2011). However, because of the small sample size, in this study only loadings that were  $>.4$  were considered to be significant (Field, 2013; Stevens, 2009).

#### **Factor analysis for Section 2, ICT applications**

As discussed above, PCA with Direct Oblimin were run for Section 2 of the questionnaire on participants' use of ICT applications. The item loadings were suppressed to .4. This analysis initially showed that there were three components with Eigenvalues greater than 1 (Appendix 13A). These values suggested that a three-component solution might be possible. Yet, when they were plotted against the scree test (see Figure 8 below) a different result was found.

Figure 8 Scree plot for items on ICT applications



As shown in Figure 8, the plot starts to level off at Component number 3, suggesting that 2 Components might be retained. Factor analysis was run again. I forced the number of components to be 3 and 2 to further explore the pattern. This is shown in Table 3 below.

Table 3 Pattern Coefficients for Three- and Two-Component Solutions

	Three-component solution			Two-component solution	
	1	2	3	1	2
Tutorials	-.162	<b>.680</b>	-.017	<b>.659</b>	.240
Electronic dictionaries	.231	<b>.662</b>	<b>.557</b>	<b>.478</b>	-.175
Word recognition software	-.165	<b>.618</b>	-.164	<b>.653</b>	.243
Web-based activities	<b>.472</b>	.359	-.077	<b>.451</b>	<b>-.406</b>
Word-processor	.365	<b>.417</b>	-.295	<b>.576</b>	-.284
Power Point	.147	.160	<b>-.849</b>	<b>.501</b>	-.072
Digitized audio-video	.148	<b>.552</b>	.015	<b>.562</b>	-.077
Voice chat	<b>.918</b>	-.061	-.071	.092	<b>-.887</b>
Audio/Video conferencing	<b>.897</b>	-.183	.056	-.080	<b>-.889</b>

A look at the above table suggests that a two-component solution might be more desirable, as it had fewer cross loadings on each component than a three-component solution. The solution would also be more interpretable. Finally, a two-component solution was decided for Section 2 of the questionnaire. This solution explained 47.4% of the total variance, with Component 1 contributing 30.79%, and Component 2 16.63%. I then named each of the components based on what seems to be a common element that each shared. Component 1 was thus named ‘ICT applications for teaching’, and Component 2 was named ‘ICT applications for communicating’.

Finally, the Cronbach’s alpha of each tentative component was checked to make sure that the items in each component were internally consistent. The Cronbach’s alpha for Component 1 was .666 and that for Component 2 was .830. According to Kline (1999), for a scale to be reliable, Cronbach’s alpha should be  $\geq .7$  to be accepted. However, because Cronbach’s alpha tend to depend on the number of items in a scale (Field, 2013), it is not uncommon for Cronbach’s alpha to be less than .7 when the number of items in a scale is fewer than 10 (Pallant, 2011). Therefore, the Cronbach’s alpha for Component 1 of .666 was considered acceptable because this component encompassed seven items. Table 4 presents loadings after rotation. The table also contains information on the Eigenvalues, % of variance, and Cronbach’s alpha of the two components ‘ICT applications for teaching’ and ‘ICT applications for communicating’.

**Table 4** Summary of Factor Analysis for ICT Applications

N=81	Rotated factor loading	
	Component	
	ICT for teaching	ICT for communicating
Tutorials	<b>.659</b>	.240
Electronic dictionaries	<b>.478</b>	-.175
Word recognition software	<b>.653</b>	.243
Web-based activities	<b>.451</b>	<b>-.406</b>
Word-processor	<b>.576</b>	-.284
Power Point	<b>.501</b>	-.072
Digitized audio-video	<b>.562</b>	-.077
Voice chat	.092	<b>-.887</b>
Audio/video conferencing	-.080	<b>-.889</b>
<b>Eigenvalues</b>	<b>2.77</b>	<b>1.49</b>
<b>% variance</b>	<b>30.79%</b>	<b>16.63%</b>
<b>Cronbach's alpha</b>	<b>.666</b>	<b>.830</b>

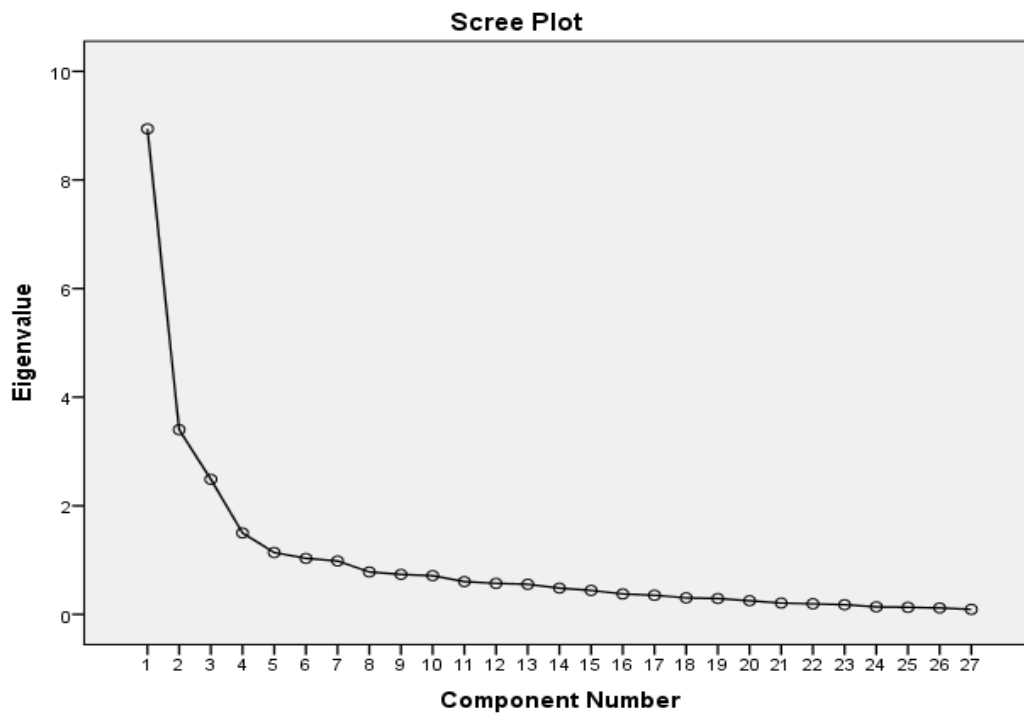
Thus, exploratory factor analysis on Section 2 of the questionnaire on ICT applications revealed that in the Hanoi University's EFL teachers' self-report, two groups of ICT applications: 'ICT applications for teaching' and 'ICT applications for communicating' were employed in their classroom teaching.

#### **Factor analysis for Section 3, Factors influencing use**

Similar to section 2 of the questionnaire, PCA with Direct Oblimin was run for Section 3 of the questionnaire on the factors influencing EFL teachers' ICT use in classroom teaching. The item loadings were also suppressed to .4. Previously, I grouped the broad set of factors into Teacher-related, Student-related, Peer-related, Technician-related, Administrator-related and Technology-related factors. Initial analysis showed that there were six Components with Eigenvalues >1, suggesting that there might be six

Components (Appendix 13B). Next, these six Components were plotted against a scree test to decide how many to retain. Figure 9 presents this scree plot.

*Figure 9* Scree plot for items on factors affecting teachers' ICT use



As can be seen from Figure 9, there was a clear break before Component 4, so a three-component solution was chosen. This three-component solution explained 54.92% of the variance, with Component 1 contributing 33.11%, Component 2 12.59% and Component 3 9.21%. I named the components, using the process described previously, and then calculated a Cronbach's alpha for each tentative component to check for internal consistency.

Table 5 details the findings after rotation, showing which items clung together in each Component. Component 1 was named 'Access & Provision', Component 2: 'Institutional Culture', and Component 3: 'Teacher Beliefs & Knowledge'. Cronbach's alpha for these Components 1, 2 and 3 were .922, .851, and .806 respectively (>.7) suggesting acceptable internal consistency among items that belonged to each component after factor analysis.



**Table 5** Summary of Factor Analysis for Factors Influencing EFL Teachers' ICT Use

N=81	Rotated factor loadings		
	Component		
	1	2	3
	Access & Provision	Institutional Culture	Teacher Beliefs & Knowledge
Having access to professional development	<b>.794</b>	.139	-.043
Access to reliable technology	<b>.786</b>	-.141	.021
Access to enough computers for students	<b>.760</b>	-.150	.101
Knowing that department has supporting syllabus	<b>.749</b>	.048	.151
Teaching resources easily located	<b>.745</b>	-.061	.030
University financial support	<b>.738</b>	.208	-.197
Having access to clear guidelines	<b>.727</b>	.329	-.199
Provision of teaching resources by department	<b>.709</b>	.182	.103
Having enough time to prepare lessons	<b>.640</b>	-.284	.257
Having on-site technical support	<b>.637</b>	-.025	.112
Having administrative assistance	<b>.630</b>	.156	-.037
Access to computer lab when in need	<b>.603</b>	-.200	.302
Having after-hours technical support	<b>.563</b>	.335	-.131
Teacher commitment to using ICT	.075	<b>.826</b>	.087
Knowing colleagues will help use ICT in instruction	.120	<b>.801</b>	.026
Knowing colleagues' commitment to using ICT	.182	<b>.777</b>	-.031
Knowing colleagues willing to share technological resources	.068	<b>.746</b>	.044
Teachers' belief in students' assistance	-.249	<b>.613</b>	.120
Students' prior experience	.039	<b>.529</b>	.221
Knowing ICT use required by the department	.311	<b>.442</b>	.105
ICT relevance to teaching practice	.035	-.017	<b>.755</b>
Student motivation to use ICT	-.113	.168	<b>.682</b>
Teachers' beliefs in ICT benefits	-.185	.188	<b>.661</b>
Teachers' knowledge of ICT use to teach English	.346	-.021	<b>.657</b>
ICT relevance to curriculum	.131	.008	<b>.641</b>
Teachers' knowledge of where to look for support	.261	-.082	<b>.607</b>
Student technical knowledge	.016	.266	<b>.429</b>
<b>Eigen values</b>	8.94	3.40	2.48
<b>%variance</b>	33.11%	12.59%	9.21%
<b>Cronbach's alpha</b>	.922	.851	.806

Thus, exploratory factor analysis for Section 3 of the questionnaire on a broad set of factors influencing teachers' ICT use showed that, unlike my initial intention when grouping the factors influencing teachers' ICT use into six groups, these factors were reflected through the EFL teachers' self-report in three main groups: 'Access & Provision', 'Institutional Culture' and 'Teacher Beliefs & Knowledge'.

#### ***4.2.2.2 Relationship between teachers' use of ICT applications and factors influencing ICT use***

As the report has shown so far through exploratory factor analysis, there are two Components for ICT applications, i.e., 'ICT applications for teaching' and 'ICT applications for communicating'. Also, there are three Components for factors influencing teachers' ICT use: 'Access & Provision', 'Institutional Culture' and 'Teacher Beliefs & Knowledge'. The total scores for these Components were subsequently calculated (to prepare for the calculation of Spearman Rhos). The Spearman Rhos, which could be used to investigate the relationships between non-continuous variables (Field, 2013; Gravetter & Wallnau, 2007; Pallant, 2011), were then calculated and are presented in Table 6 below.

**Table 6** *Spearman Rhos on ICT Applications Use and Factors Influencing ICT Use*

	<b>Access &amp; Provision</b>	<b>Institutional Culture</b>	<b>Teacher Beliefs &amp; Knowledge</b>
ICT applications for teaching	.326**	.183	.462**
ICT applications for communicating	.101	.284*	.109

\* $p < .05$ , \*\* $p < .01$ .

Table 6 shows that there were statistically significant correlations between 'ICT applications for teaching' and 'Access & Provision', and for 'ICT applications for teaching' and 'Teacher Beliefs & Knowledge' (with Spearman Rhos-  $\rho$  being .326 and

.462 respectively,  $p < .01$ ). The correlations were also positive. In addition, there was a statistically significant correlation between 'Institutional Culture' and teachers' use of 'ICT applications for communicating'. The Spearman Rho was .284 ( $p < .05$ ).

The table also shows that in the EFL teachers' self-report, 'Teacher Beliefs & Knowledge' was the strongest predictor of their use of 'ICT applications for teaching'. It seems that the more beliefs and knowledge the teachers thought that they had, the more frequently they used 'ICT applications for teaching'. In addition, the EFL teachers were also concerned about 'Access & Provision' factors when they attempted to use the 'ICT applications for teaching'. Interestingly, when the teachers used 'ICT applications for communicating', they were more concerned with 'Institutional Culture' factors, such as their peers and their students.

In summary, findings from the questionnaire show that the EFL teachers' self-reported that the listed factors had an impact on their ICT use, though the level of impact varied. Also, the listed factors could be classified into three groups, which could be labelled as 'Access & Provision', 'Institutional Culture' and 'Teacher Beliefs & Knowledge'. Of these three groups of factors, 'Teacher Beliefs & Knowledge' was the strongest predictor of the teachers' use of 'ICT applications for teaching'. In addition, there was a positive correlation between 'Institutional Culture' and teachers' use of 'ICT applications for communicating'. The findings from the semi-structured interviews with seven EFL teachers on the factors influencing their use of ICT in classroom teaching are discussed below.

#### **4.2.3 Interview findings around influence of factors**

Interview findings in relation to the impact of the factors influencing teachers' use of ICT in classroom practice were gathered from seven questions, which were categorised into six groups: teacher-related factors, student-related factors, technician-related factors,

administrator-related factors, and technology-related factors. The report of the interview findings on the influence of factors is organised into these six groups, and is presented below. It should be noted that I organise the interview findings in this way because this categorisation of the factors came up from the literature, as depicted in the summary representation of the factors (see Section 2.2.7, Chapter Two).

#### ***4.2.3.1 Teacher-related factors***

The teachers commented on teacher-related factors specifically in relation to teachers' perceived benefits of ICT to their EFL teaching, teachers' resistance and doubts and teachers' knowledge of the English language.

##### **Teachers' perceptions of ICT benefits to EFL teaching**

All seven teachers interviewed commented on the benefits of ICT to their EFL teaching. However, what they perceived as beneficial varied. For example, three of the teachers commented that ICT made lessons more interesting and provided motivation for students to learn English. This can be seen in the following examples.

In my opinion, ICT plays a big role in English language teaching. It has a big role in language teaching. First, it makes the lessons more interesting and it also makes the lesson look more professional. Second, students could have more motivations in learning because I think they prefer a bit of ICT in a lesson than the traditional way of teaching where there is only the teacher, the students, talking and writing and a text book (Mary).

... It would be more interesting with ICT than the paper-based lesson. With ICT, not only the teacher but also the students could engage more into the lesson to make it more interesting, for example, through the use of some software packages, movies or recording software. These will make the instruction process much more effective ... (Daisy).

Furthermore, not all textbooks are up to date, so teachers could look for online teaching resources and electronic lesson plans to help engaging students more into classroom lessons (Cindy).

In comparison, three other teachers commented on how ICT assisted them in their teaching, ranging from 'helping them to prepare lessons at home' (Judy) to 'bringing new ways of teaching English' (Valerie) and delivering authentic English as mentioned by Mark.

ICT is being used widely in many fields, especially in English language teaching where teachers are applying ICT to a great extent. The use of ICT has helped bring about more quality teaching and made

the teaching job less time-consuming ... All these will bring a more authentic context for students to learn English.

Two teachers commented that ICT could help them and students communicate with one another. For example, Helen reported that:

I think ICT assists in communication between teachers and students in terms of assignment marking and correcting. Because a teacher can teach several classes at the same time, for example in a writing class, students need teachers' feedback to their written work, and it is impossible to provide quality feedback to 25 pieces of writing at the same time in class because the total class time is only 1.5 or 3 hours. In this case, the teacher will need to use email and Skype or a chatting software to communicate with students whose work has not been marked/corrected in class. Furthermore, ICT can be a bridge that connects teachers, for example, online forums could be a good place for teachers to exchange their ideas and share the difficulties they encounter in their teaching.

Judy shared the same idea:

I think ICT is assisting both teachers and learners ... it facilitates communications between both teachers and students, for example, they can communicate with one another on an online forum.

Two other teachers commented on another benefit, around using ICT as an assisting tool, especially in teaching pronunciation, as their comments show below:

In the modern time, not only I but many other teachers of English are using ICT in our classroom instruction because ICT helps us a lot in teaching four language skills: listening, speaking, reading and writing. For example in teaching pronunciation, if teachers use some software or pronunciation websites for students, it would be much easier for them to learn properly if they are provided with some visual aids on the structure of vocal organs such as mouth and nasal cavities, or the proper positions of the vocal organs, they can imitate more easily (Cindy).

For example, in teaching pronunciation, not all teachers have good pronunciation capabilities; in that case, ICT would be more beneficial to students in correcting their pronunciation mistakes (Judy).

Two teachers (Judy and Mary) indicated that their perceptions on the benefits of ICT to EFL teaching resulted in their voluntary use of ICT in their classroom teaching. They emphasised that because they saw the benefits, even though it was not required by the university/department, they still took every opportunity to use ICT in their classroom teaching.

No one forces me to use ICT in teaching English. I have been using ICT because I see the positive impact of ICT on my teaching, as I stated before, my lessons would be more interesting and ICT could assist both teachers and students ... In my opinion, we can't say why we must use ICT; instead, why we should use ICT in teaching. (Judy)

I sometimes take my students to the projector room in the Speaking lesson although I am not officially required to do so, I want a change for my students through the use of projectors because they can practice their speaking skills through making presentation. Learning with projectors I know that it is an advantage, students could feel more motivated to study... because projectors can bring about audio-visual effects, which makes students like the lessons better. (Mary)

### **Teachers' resistance and doubts**

While perceived benefits tended to be given attention by all the seven teachers interviewed, there was some emphasis on resistance and doubts about ICT use among the teachers, as reported by two teachers, Valerie and Mark:

Previously when I was asked about the feasibility of ICT use in our university, I was not very optimistic because I saw a big resistance from the teachers. The reasons were that the teachers were so used to the paper and pen teaching method and the available paper-based teaching materials as well as lesson plans; when there's a change (ICT), they will have to change everything. (Valerie)

ICT is a new thing ... because ICT is a new thing, no one can be 100% sure about its efficiency.  
(Mark)

Yet, these two teachers commented that teachers' resistance and doubts could be reduced by the university providing enough resources and by teachers' willingness to take risks to try ICT and to experience the effectiveness of ICT first-hand.

### **Teachers' knowledge about the English language**

Nearly half of the interviewed teachers commented on the positive impact of their knowledge about the English language on their ICT use in relation to professional development and access to resources. For example, Mary commented that the teachers' English language knowledge could help them understand technical instructions more easily as technical manuals were normally written in English.

Also, Daisy thought that with their English language knowledge, the teachers could self-learn technical aspects of some software packages, test run packages and try integrating them into their classroom practice sometimes without the assistance of the technicians.

Additionally, Helen indicated that the teachers' English language knowledge also helped them gain access to and understand original English documents on the web, such as when they looked for resources for teaching and professional development. As a result,

Helen felt the teachers could have a more exact understanding of the materials than when reading translations of the documents.

#### **4.2.3.2 Student-related factors**

The teachers provided comments on student-related factors in relation to students' prior experience, and students' technical and skills.

##### **Students' prior experience**

For the most part, the teachers commented that differences in students' prior experience with ICT had little impact on them, as shown in these comments:

I think that there is a small impact by my students [technical skills] because the subject that I am teaching does not require me to use much ICT. As stated earlier, I use ICT applications such as email or chat software for correcting and marking students' writing work. I think 99% of the students could use those applications, even at the expert level (Helen).

Actually at Hanoi University, the application of ICT into teaching is not too hard for teachers. For example, before using the courseware EDO (English Discovery Online), students and teachers participated in an EDO introductory course. Furthermore, in my lectures on Culture of English-speaking countries, if my students need to use projectors for their presentation, they can have weeks of preparation for their presentation, so they can seek technical assistance from me or from the technicians immediately... thus [the impact of their prior experience to ICT use] is not very considerable (Judy).

##### **Students' technical knowledge and skills**

The impact of students' technical knowledge and skills on the EFL teachers' ICT use was perceived by two teachers (Mark and Cindy) as depending on who were the users of ICT in the class. If teachers were the sole users of ICT in the class, then students' technical knowledge and skills appeared to have no impact. However, when both teachers and students were ICT users in the class, students' technical knowledge and skills appeared to matter. If students lacked technical knowledge to complete ICT-related tasks, there was a greater reliance on the teacher (Mark).

Moreover according to these two teachers, the extent to which students' ICT skills and knowledge levels is an influencing factor seemed to depend on the teaching styles the EFL teachers adopted. They both gave examples on teacher-centric ICT use and student-centric ICT use to illustrate the impact of students' ICT skills and knowledge:

If a teacher integrates ICT to the extent that he/she just uses ICT to display information, then students' technical knowledge and skills does not have any influence at all. If a teacher uses Web-based activities in teaching, students will then need to master certain basic skills such as turning on/off the computer, logging in and off some software and information literacy skills. In classroom teaching, if a student is without those skills, then teachers would need to help. (Mark)

For example, if I need to find teaching resources from the Internet and modify them to use in my Listening class through laptop and loudspeaker, students' technical knowledge does not seem to influence, because teachers are the only users of ICT in that class ... In other lessons, if teachers use Power Point to model a good presentation, and later students are the ones who use the software for their individual presentations, it would be an impact if students could not use computers. Or in a pronunciation lesson, if students need to use ICT to record their practice, it would be very hard for them to do so without knowing how to function the software properly, that is when there is an impact and when they need their teachers' assistance (Cindy).

Notably, the teachers were not bothered if the students' levels of technical skills were higher than their own. On the contrary, they saw this as a benefit. In this case, the teachers tended to use students with better technical skills as an aid in their classes. The following comment by Mark is typical in this regard:

... If teachers could ask students who are better technically to assist those who are weaker, or to teach their teachers some tricks to use ICT, I think students would be willing to do so because their skills are highly appreciated ... Teachers should not think that they must always be better than their students, especially when it comes to ICT (Mark).

Indeed, Cindy thought that if students had better technical knowledge and skills, this could even become a motivation for teachers to learn more about ICT. As she elaborated, she would be "happy to learn from her students" and thought that this would be "a good chance for her as a teacher to know these students' learning needs", so she "could design lessons with ICT to meet their expectations". Another teacher (Judy), however, raised concerns about "losing her managerial position in class," if students were technically better, but later acknowledged that if that was the case, she would need to learn more about ICT to catch up with her students.

Finally, three teachers acknowledged that there was a gap in students' technical knowledge and skills, which had certain level of impact on their use of ICT. According to what they reported, the students who came from a metropolitan area appeared to be better than students who came from the rural setting in terms of technical knowledge and skills:



Students could have access to computers and the Internet in high school, so they could use computers, the Internet and software fairly well. However, for those who come from the rural or remote area, they still have difficulties. Some of them might not know how to use Word or Excel (Mark).

Students who come from the city have better access to ICT and can keep themselves updated, yet there are a big number of students who come from other areas, some of which do not have Internet coverage, so it is not surprising that these students have never touched a computer or used the Internet (Mary).

There is a certain gap in technical skills between students who come from Hanoi and those who come from other provinces (Valerie).

Although the teachers did not think that this gap was a barrier to their ICT use (Mary), they did indicate that this gap made the students puzzled for a few weeks at the beginning (Valerie). They also reported that they needed to provide technical assistance to students who were in need. As commented by Mary, she needed to spend the first 15 minutes of the lesson instructing students on how to use some technical features.

#### **4.2.3.3 Peer-related factors**

The interviewed teacher commented on peer-related factors in relation to peer support in sharing resources and ideas, as well as observed peer practice.

##### **Peer support**

All seven participants commented positively on peer support. This was reflected by comments around being able to share resources and to exchange ideas on how to use ICT in classes. To illustrate this, Daisy mentioned that a teacher from the Language Skills Section in the English Department helped install a recording software named *Audacity* on her laptop and instructed her on how to use it, so she could later use it to record talks and amend audio files recorded from seminars and conferences as teaching materials for her Interpretation classes.

Another teacher, Helen, reported that those teachers, who taught the same subjects or skills, could exchange their lessons plans on the same topics or an interesting video clip downloaded from the Internet that could be used for teaching.

The other four teachers Cindy, Valerie, Judy and Mary also stated that they could ask their colleagues for help “through chatting during breaks” (Judy) between classes if they

had difficulties in using ICT, such as modifying sounds in audio files or downloading teaching materials from the Internet.

Mark emphasised that for ICT use to be effective, “it is normal practice for teachers to seek help from their colleagues for those things that they don’t know and to offer assistance to their colleagues on aspects that they are good at”. This position was also supported by Mary in her comment that teachers were “not hesitant to approach their peers [who they saw using ICT in teaching] to ask the peer to share experience ... because being helpful is one typical feature of peers at the university”.

#### **Peer use of ICT**

Some teachers perceived that their colleagues’ use of ICT in classes was motivating, as shown by Cindy’s comment:

I think that our colleagues’ use of ICT has a fairly big impact, because we are inquisitive about things people are doing around us. For example, I don’t use any ICT in my teaching, but if I pass by a class where my colleague is using ICT and his/her students are using laptops, I would question myself whether that would be more effective than the traditional way of teaching without ICT. Because as a teacher, I always strive to bring the most effective and engaging lessons, so when I see my colleagues using ICT, I would like to try ICT to see whether it would be good or bad to my instruction, how effective it would be, things I might never know before.

Helen likewise mentioned the positive impact her colleagues had on her ICT use:

I think that my colleagues’ use of ICT has a fairly big impact on my ICT use in classroom teaching. For example, if I could see that my colleagues’ students are motivated and engaged in ICT-based lessons or in a class where video clips are used, I would very much like to try those ICT things with my students to see how effective they are.

Daisy, however, seems to be inferring that seeing her colleagues using ICT puts pressure on her to do the same, as shown in this comment:

I could actually see that my colleagues in the Interpretation/Translation section are using ICT extensively, for example, they use ICT to record speeches on TV, download or record talks from conferences and seminars ... This shows that ICT is beneficial, so I think I will definitely learn to use ICT in my teaching, to catch up with my colleagues ...

#### ***4.2.3.4 Technician-related factors***

The teachers seemed to give varied opinions on different types of technical support provided to them at the university.

### **On-site technical support**

Most of the EFL teachers commented that technical support provided by the university during working hours was important to their use of ICT when they had technical difficulties that they could not solve themselves (Mary, Daisy, Judy, Valerie and Cindy). But the perceived value of technical support was different for Cindy, who stated that the need for technical support depended on the types of equipment and applications a teacher used in a class. If that was a teacher's own equipment (such as a laptop), there might not be any demand for technical assistance. But if teachers used the university's equipment, in the event of technical problems, they would call for a technician to help them out.

I think this [on-site technical assistance] depends on how I use ICT. For example, if I use audio files to teach listening comprehension, I used my own laptop and store the files in it, I would rather not use the CD players provided by the university because I am afraid of scratched CDs, or of being passive in sound control. If I bring my own laptop to class, I don't think that I will need technical assistance, and in fact, there is no assistance in such cases. However, if I teach presentation skills in a room with computer connected projectors, and if there are problems with the software that is not compatible with the laptop, or if teachers plug in the laptop but the projector do not work, I will then call the technicians to come for help, and they will come to help.

### **After-hours technical support**

Yet, when it comes to after-hours technical support, the teachers gave a different view, with the majority of the teachers (six out of seven) indicating that they did not use this service. Helen commented that she was unsure whether this service was provided and who she should contact for questions about technical aspects. Others such as Mary, Daisy, Judy, Valerie and Cindy stated that their preference was to ask their relatives/friends or their colleagues. Only one teacher, Mark, used this service, and who interestingly reported that this collaboration with the university technicians had mutual benefits. As a result of his personal contacts with technicians, he "would personally ask the technicians for assistance to help with his technical questions". He thought that it would be beneficial if he and the university technicians could work together using their own strengths, namely his English knowledge and the technicians' technical knowledge.

#### ***4.2.3.5 Administrator-related factors***

All seven teachers commented that departmental encouragement to use ICT in EFL teaching was important as this was a motivating factor for ICT use in their practice. Yet they later acknowledged that departmental support was often lacking. This included a lack of administrative support, a lack of clear guidelines and a lack of professional development.

##### **Administrative support**

Half of the teachers interviewed indicated a lack of administrative support. Mark, for example, commented that administrator support only involved posting announcements on department websites. Helen revealed that administrator support involved training teachers how to use some software for storing/submitting students' marks; or as Cindy disclosed, purchasing three portable projectors for the teachers to use in the English Department in addition to the equipment provided by the university.

##### **Policies**

Likewise, more than half of the teachers stated that they were not aware of any clear policies or guidelines on integrating ICT into the classroom. The following comments by Helen, Daisy, Judy and Valerie illustrate this view:

There are no clear regulations on ICT use in English teaching (Helen).

In terms of regulations, I don't think that any regulations are made known widely to the teachers (Daisy).

ICT use in teaching practice is not compulsory in Hanoi University and in the English Department; it is impulsive and totally up to the teachers to do it. But in my opinion, even if there is encouragement, there should be clear guidelines and proper assessment to make ICT use more effective to teaching and learning (Judy).

I don't know of any policies that require teachers to make ICT a component in their teaching at Hanoi University. I think that it is impossible because of a lack of facilities and coordination, so even if teachers are forced to do so, they could not do it. This is really pitiful at a big university like Hanoi University (Valerie).

Accordingly, one teacher, Judy, proposed that there should be an ICT plan with proper strategies for five or 10 years' time. Valerie suggested that the head of each section in every department should understand ICT and its applications into their relevant subject.

ICT at Hanoi University has not been integrated to its full potential because of a lack of vision. In my opinion, in order to do this, the head of each section in every department must understand ICT and its application in their specialization. Because in terms of practicality and logistics, if they don't start doing things, they don't know what the obstacles are. The heads, therefore, must understand the goals of using ICT, how ICT can be used as a means of achieving those goals, how to make ICT become a means, the need to have a route/plan for training, for available resources and facilities, and support from technicians ... all of these must be in line with one another.

### **Professional development**

Finally, a lack of support in relation to professional development was reported by two teachers. In their views, there was virtually no professional development except for some small workshops or seminars, which were not very effective in supporting the development of their confidence to implement ICT in their practice. This was reflected in comments such as these: "the opportunities for training, even though little or short-term, on using ICT in EFL teaching has never been officially conducted at the university" (Mary); and "if there is some training at all, this is very trivial, in the form of some very minor workshops, and which is not accompanied with the things that could make teachers confident enough to start using ICT in their practice" (Valerie).

The EFL teachers commented that they thought administrator-organised seminars or workshops focused on the technical aspects of the software package and not on the pedagogical aspects, which was what they felt they needed. As a result, these teachers reported that their colleagues and friends were the main sources for their professional development. Mary, Daisy and Cindy commented that they could trust their colleagues and friends and that answers could be provided by the colleagues and friends in a timely manner.

#### **4.2.3.6 Technology-related factors**

In relation to technology-related factors, the EFL teachers commented specifically on a lack of facilities and technical breakdowns, as well as issues with resource provision at the university.

##### **Lack of facilities and technical breakdowns**

Two EFL teachers reported that, although they attempted to use ICT in their classroom practice, both a lack of facilities and technical breakdowns appeared to hinder their attempts. Valerie said she could not use computers and projectors to play a video clip in the Speaking lesson because the equipment was not available in her classroom. Moreover, in the lab where there was a computer, the projector screen was so blurry that it could not show the interactive grammar exercises she had prepared for her students, so the computer could only function “as a TV”. In addition, Judy reported that in teaching English culture to students, she frequently encountered problems in downloading audio and video files for students to work on, which was very frustrating for her.

##### **Resource provision at the university**

Some of the teachers implied that they thought the investment in technical infrastructure by the university was not always synonymous with ICT use by the teachers. This view is reflected in the comment by Mary that follows.

As far as I know, the university always invests in the best infrastructure with the expectations that this will optimize language learning and teaching at the university. The technology is the most updated one, which is supposed to bring about positive learning outcomes. But whether the teachers will fully integrate the technology in their EFL teaching is a different story. I think some technologies are being overused while some are underused, which might be a waste of resources ... For example, videos are least frequently used while projectors are used too often so that teachers need to book one or two weeks in advance to be able to use projectors for teaching presentation skills.

In the worst case, this may become a waste of resources, as with some computer labs, because of a lack of coordination between the university/department/technical centre and teachers. Valerie reported that she witnessed that there were some modern computer labs

that were underused by the teachers, while the university was wasting resources such as electricity on these rooms because the air conditioners were still turned on for the purpose of maintenance of the computers in these rooms.

Additionally, one teacher, Valerie, stressed the need to provide EFL teachers with enough teaching resources and exposure to opportunities of ICT use. She felt these could change teacher resistance to ICT use in classroom teaching.

Previously when I was asked about the feasibility of ICT use in our university, I was not very optimistic because I saw a big resistance from the teachers. However, when I was working with the Dean of the English Department on a new syllabus for students, we bought soft copies of the new textbooks, CD ROM, teachers' books ... everything was available and I started using the resources and I realised that the change was not that difficult as I initially thought. In the English Department, not all teachers are using ICT in their teaching, mostly because they are not provided with enough resources. But with enough resources, teaching is much easier than the traditional way; it can be time-saving and can also help change the classroom mode.

In summary, interview findings show that from the EFL teachers' perspective, the factors influencing their ICT use came from different sources, such as from the teachers themselves, their students, their colleagues, the technicians, the administrators and the technology. The level of impact of these factors on teachers' use of ICT in classroom teaching was also different. Teachers' self-assessed TPACK is discussed below.

#### **4.2.4 Questionnaire findings around TPACK**

This section reports on the EFL teachers' self-report on their TPACK, as influencing their decision to use ICT. The participants were asked to rate their level of knowledge in relation to each of the seven TPACK domains (TK, CK, PK, PCK, TCK, TPK and TPACK) using a four-point scale: *Not at all (1), Little (2), Moderate (3) and Much (4)*. Similar to the section 4.2 of this chapter, findings on teachers' TPACK were obtained from the mean score (M) and standard deviation (SD) of the ratings of the amount of knowledge. These mean ratings (including the SD) are presented in Table 7 below.

**Table 7** Mean Score and Standard Deviation on Ratings of Teachers' TPACK

(1-Not at all, 2- Little, 3-Moderate, 4- Much)

Item (*N=81)	*M	*SD
CK1-English language knowledge	3.52	0.55
PK3-Classroom management knowledge	3.43	0.55
PK4-Teaching planning knowledge	3.43	0.55
TK1-Common ICT applications knowledge	3.38	0.75
PK5-Student learning assessment knowledge	3.37	0.51
PCK1-Input modifying knowledge	3.32	0.59
CK2-Linguistic knowledge	3.27	0.63
PCK2-Student interaction knowledge	3.17	0.61
PK2-Different learning styles catering knowledge	3.12	0.60
PK1-Learning theories knowledge	3.05	0.67
TK3-Technology updating ability	3.05	0.71
TK2-Troubleshooting technical problems knowledge	3.02	0.87
CK3-English speaking countries culture knowledge	3.02	0.65
TCK1-ICT applications for English language knowledge	2.84	0.66
TPK4-Lesson preparation using ICT knowledge	2.84	0.64
TPK3-Classroom management using ICT knowledge	2.74	0.63
TPACK2-Task designing using ICT knowledge	2.70	0.66
TK5-Student learning assessment with ICT knowledge	2.70	0.66
TPACK1-Student learning English with ICT knowledge	2.65	0.73
TCK2-ICT applications for English linguistics knowledge	2.64	0.71
TCK3-ICT applications for English culture knowledge	2.63	0.78
TPK2-Different learning styles with ICT catering knowledge	2.58	0.69
TPK1-ICT learning theories knowledge	2.43	0.67
TPACK3-Software evaluation knowledge	2.36	0.68

\* Note: N= Sample size, M= Mean score, SD= Standard Deviation

Table 7 provides information on the self-rating of the teachers' TPACK. Generally speaking, the EFL teachers indicated that they had knowledge in all seven TPACK domains (all mean score of the ratings were above 2), yet the amounts of knowledge they reported in these domains varied (with the mean score of the ratings ranging from 2.36 to 3.52, SD varied). Overall, higher levels of knowledge were reported in relation to CK, PK and PCK, than for TCK, TPK and TPACK. The only exception was the TK item 'ICT applications knowledge', which was rated as the third highest item (M=3.38, SD=0.75).



A closer analysis of how participants rated individual items showed the following trends. The highest rated item of all the listed 24 TPACK items was a CK item 'English language knowledge', with M being 3.52 (SD=0.55).

Next, the second highest rated items were two items in the PK domain, 'Classroom management knowledge' and 'Teaching planning knowledge'. The mean scores for the ratings of these two items were both 3.43, with the same SD being 0.55.

One TK item, 'Common ICT applications knowledge' was rated the third highest with M being 3.38 (SD=0.75). This was followed by a number of PK, PCK and CK, namely 'Student learning assessment knowledge' (M=3.37, SD=0.51), 'Input modifying knowledge' (M=3.32, SD=0.59), and 'Linguistic knowledge' (M= 3.27, SD=0.63). A whole gamut of CK, PK and PCK items had the ratings mean score of more than 3.0 (SD varied), ranging from 3.02 to 3.27.

In contrast to these ratings, a number of items around TPK, TCK and TPACK were rated very low by the participants. The lowest rated item of all was a TPACK item, 'Software evaluation knowledge' (M=2.36, SD=0.68), followed by two TPK items 'ICT learning theories knowledge' (M=2.43, SD=0.67), and 'Different learning styles with ICT catering knowledge' (M=2.58, SD=0.69). Additionally, two TCK items, 'ICT applications for English culture knowledge' (M=2.63, SD=0.78) and 'ICT applications for English linguistics knowledge' (M=2.64, SD=0.71) were the fourth and fifth lowest rated items of all the listed 24 TPACK items. A whole gamut of other TPK, TCK and TPACK items also received low ratings from the teachers, with the mean score all below 3.0 (being from 2.65 to 2.84, SD varied).

In summary, higher levels of knowledge was reported for CK, PK and PCK items than for TCK, TPK and TPACK items. This shows that the EFL teachers rated that they had

much knowledge in relation to CK, PK and PCK domains. In contrast, they rated that they had less knowledge in relation to TCK, TPK and TPACK.

#### **4.2.5 Questionnaire findings on relationships between teachers' ICT use and TPACK**

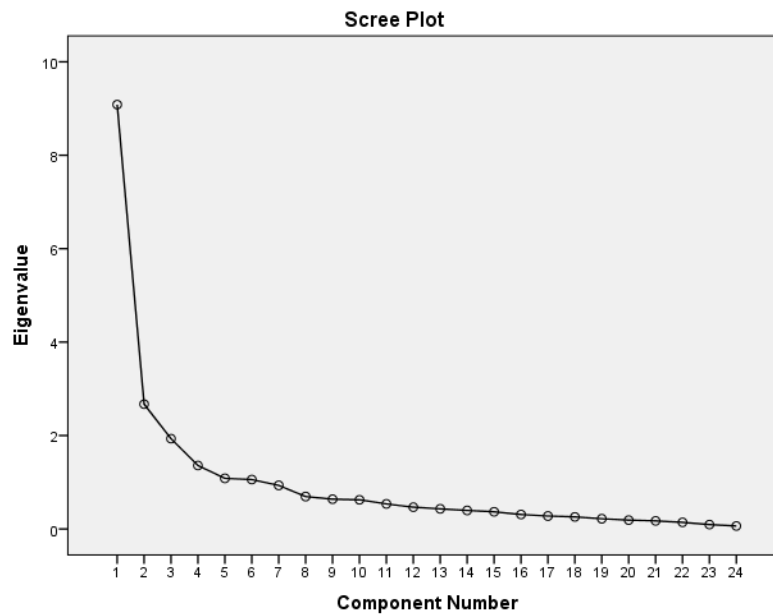
In investigating the relationships between the EFL teachers' use of ICT applications and their TPACK, I also calculated Spearman Rhos. In order to reduce the number of items on teachers' TPACK, I also ran exploratory factor analysis.

##### ***4.2.5.1 Exploratory factor analysis for questionnaire section 4 on teachers' TPACK***

Before running factor analysis, I tested the suitability of this questionnaire section on TPACK for factorability through KMO and Barlett's test of sphericity. The KMO was .799 and Barlett's test of sphericity was .000, suggesting the suitability of this section for factor analysis (Field, 2013; Pallant, 2011). The correlation matrix of this questionnaire section was also examined to investigate the relationships among the items. I also looked for correlations greater than .3 because this would show the suitability of the section for factor analysis (Field, 2013; Pallant, 2011). A number of items in the matrix (Appendix 12C) had correlations greater than .3, suggesting the suitability of the section for factor analysis.

The same PCA with Direct Oblimin procedure used with Sections 2 and 3 was also used in relation to Section 4 of the questionnaire, which collected data around EFL teachers' TPACK. I also suppressed the item loadings to .4 because of the small sample size. Initial results suggested that there were six Eigenvalues greater than 1 (Appendix 13C). Again, these values were plotted against a scree test as shown in Figure 10.

Figure 10 Scree plot for items on EFL teachers' TPACK



A look at the scree plot showed that a break could be seen before Component 3 or Component 4 or Component 5, suggesting that either a two-component solution, three-component solution or four-component solution might be possible. An analysis was run again, and I forced the number of factors to be 2, 3 and 4. However, rotation for 3 and 4 components failed, making it impossible to interpret the component structures. As a result, a two-component solution was decided on. This solution explained 48.98% of the total variance, with Component 1 contributing 37.85%, and Component 2- 11.13%.

Again, each Component was named through the same process as discussed earlier, and a Cronbach's alpha of each tentative Component was calculated to check for internal consistency. Table 8 presents loadings after rotation, which shows that there were two Components, namely 'Technology-Related Knowledge Domain' (TKD) and 'Non-technology Related Knowledge Domain' (NTKD). Cronbach's alphas for these two Components were .910 and .876 respectively ( $>.7$ ), suggesting acceptable internal consistency. Interestingly, all TK items failed to load on either Component, as their loadings were below .4.

**Table 8** Summary of Factor Analysis on EFL Teachers' TPACK

N=81	Rotated loadings	
	Component	
	Technology-Related Knowledge Domain	Non-Technology Related Knowledge Domain
TPK5- Student learning assessment using ICT knowledge	<b>.843</b>	-.268
TPACK1- Student learning English with ICT knowledge	<b>.810</b>	-.043
TPACK2- Task-designing using ICT knowledge	<b>.788</b>	.007
TPK2-Different learning styles with ICT catering knowledge	<b>.785</b>	-.005
TPK3-Classroom management using ICT knowledge	<b>.777</b>	-.156
TCK1- ICT applications for English language knowledge	<b>.724</b>	.157
TPK1-ICT learning theories knowledge	<b>.649</b>	.169
TPK4- Lesson preparation using ICT knowledge	<b>.620</b>	-.004
TCK2- ICT applications for English linguistics knowledge	<b>.620</b>	.222
TPACK3-Software evaluation knowledge	<b>.568</b>	.092
TCK3- ICT applications for English cultures knowledge	<b>.500</b>	.320
TK3-Technology updating abilities	.382	.277
TK2-Troubleshooting technical problems knowledge	.312	.308
PK1-Learning theories knowledge	-.028	<b>.793</b>
PK2-Different learning styles catering knowledge	-.046	<b>.750</b>
PCK2-Student interaction knowledge	-.088	<b>.707</b>
CK2-Linguistic knowledge	.009	<b>.704</b>
CK3- English speaking countries culture knowledge	-.206	<b>.694</b>
CK1-English language knowledge	.100	<b>.644</b>
PK3-Classroom management knowledge	.176	<b>.636</b>
PCK1- Input modifying knowledge	.286	<b>.517</b>
PK4- Teaching planning knowledge	.311	<b>.494</b>
PK5-Student learning assessment knowledge	.259	<b>.446</b>
TK1- Common ICT applications knowledge	.349	.399
<b>Eigenvalues</b>	<b>9.08</b>	<b>2.67</b>
<b>% variance</b>	<b>37.85%</b>	<b>11.13%</b>
<b>Cronbach's alpha</b>	<b>.910</b>	<b>.876</b>

As could be seen through exploratory factor analysis of Section 4 of the questionnaire, unlike the seven knowledge groups as conceptualised in the TPACK framework, there were two groups of the EFL teachers' self-reported TPACK: 'Technology-Related Knowledge Domain' and 'Non-Technology Related Knowledge Domain'.

#### ***4.2.5.2 Relationships between teachers' use of ICT applications and their TPACK***

To explore the relationships between the teachers' use of ICT applications and their TPACK, again Spearman Rhos were calculated. Factor analysis conducted earlier shows that there were two groups of teachers' TPACK: 'Technology-Related Knowledge Domain' and 'Non-Technology Related Knowledge Domain'. There were also two groups of ICT applications 'ICT applications for teaching' and 'ICT applications for communicating'. Again, the total scores for these components were calculated before Spearman Rhos were run. Table 9 presents Spearman Rhos results.

**Table 9** Spearman Rhos on EFL Teachers' TPACK and their Use of ICT Applications

	<b>TPACK-Technology-Related Knowledge Domain</b>	<b>TPACK-Non-Technology Related Knowledge Domain</b>
ICT applications for teaching	.388**	.278*
ICT applications for communicating	.392**	.331**

\* $p < .05$ , \*\* $p < .01$ .

Table 9 shows that there were statistically significant correlations between both the EFL teachers' 'Technology-Related Knowledge' and 'Non-Technology Related Knowledge' Domains and teachers' use of 'ICT applications for teaching' (with  $\rho$  being .388,  $p < .01$  and .278,  $p < .05$  respectively). The correlations were also positive. In addition, there were statistically significant correlations between 'Technology-Related

Knowledge' and 'Non-Technology Related Knowledge' Domains and teachers' use of 'ICT applications for communicating' ( $\rho = .392$  and  $.331$ ,  $p < .01$ ).

The results indicate that in the EFL teachers' self-report, their TPACK had positive relationships with their use of ICT applications in classes (for both teaching and communicating purposes). It seems that the more TPACK the teachers had, the more likely that they used ICT applications. In addition, it seems that the Technology-Related Knowledge Domain (composed of TPK, TCK & TPACK) is the strongest predictor for teachers' use of 'ICT applications for communicating' and teachers' use of 'ICT applications for teaching'.

In summary, self-reported questionnaire findings on the EFL teachers' TPACK have shown that higher levels of knowledge were evidenced in relation to PK, PCK and CK, than for TK, TCK, TPK and TPACK. Also, the more TPACK the EFL teachers had, the more likely that they used ICT applications in their classroom instruction. The interview findings around the influence of teachers' TPACK are discussed below.

#### **4.2.6 Interview findings around influence of TPACK**

Findings about teachers' TPACK come from one interview question. Generally speaking, interview findings suggested the teachers held different points of views on the influence of their TPACK on their ICT use. For example, one teacher, Daisy, thought that her technology knowledge was helping her in teaching, but that this was limited because she had to learn technology herself. However, she did not indicate which type of technology knowledge she used to teach English.

Daisy's comments also indicated that her pedagogical beliefs seemed to have an impact on her ICT use. This was reflected in her comment that using ICT related more to her beliefs in the way ICT could be used to facilitate students' learning. For example, she

believed that teaching Translation in the traditional way (face-to-face) was the best for students, and so ICT was not needed. In contrast, she reported using ICT in teaching Interpretation, as she thought it was helpful in providing students with authentic contexts.

Similar to Daisy, some other teachers commented that if they needed to use ICT, they just added an element of technology in line with their existing knowledge about how to teach English language. A good example of this point is this comment by Judy, “It is essential that a teacher know how to use ICT properly to assist with his/her teaching to achieve learning goals and to bring about the best learning outcomes for students”, and this comment by Mark, “What matters is what the teacher, when deciding to use ICT, expects to achieve in a lesson”.

Notably, one teacher (Mark) reported his use of ICT to design learning materials that were appropriate with students’ level of knowledge. The findings imply that for this teacher, his TPK had an influence on his ICT use in relation to preparing teaching materials.

When I teach Interpretation, I often record real speeches from the workshops or conferences that I participated in as an interpreter. If I want to let my students listen to the speeches to interpret from, that is basic application [of ICT]. If I want to make my lessons more interesting and more suitable for academic settings, I will edit the audio file, for example, I will delete the segments that are too difficult for students, or breaking the sentences into different parts more appropriate with students’ level for them to practice from ...

Moreover, some teachers such as Judy and Mark commented on the importance of CK, PK and PCK in delivering better quality teaching. Notably, one teacher (Valerie) insisted that teachers’ non-technology related knowledge (CK, PK, PCK) was the most important knowledge they have. To this teacher’s mind, TK played the least significant role.

I believe that my knowledge of the English language is more important, because as a teacher I must know my job, my tasks, my variety of choices that I have made, and only when I am informed by my knowledge and information that I want to understand how ICT could help me achieve what I want, what obstacles I would face when using ICT in my teaching and how to overcome them ... The combination of knowledge about English language and pedagogical knowledge is much more important than technical knowledge. This will decide how I will use ICT as an assisting tool to teach.

Judy shared this view with Valerie because to her, teachers' knowledge and skills to use ICT (TK) as a new component in their instruction was somewhat important.

However, it would not be matter if the teachers were without that sort of knowledge and skills as they "could still fulfil their responsibility in transferring the knowledge to their students using face-to-face traditional teaching methods".

To summarise, findings from interviews with the EFL teachers indicated that they held differing opinions on the influence of their TPACK on their ICT use. Some reported that their pedagogical beliefs rather than their TPACK had some influence; while others suggested that their non-technology knowledge influenced their decision-making more than technical knowledge.

### **4.3 Relationships between teacher demographics, ICT applications and factors**

This part of the chapter reports on the third research question. Only questionnaire data was used to do so as it involved a large enough data set to allow comparison. The questionnaire had four sections. The first section, demographic information identified gender, main area of teaching experience, highest qualification, age and years of teaching experience. The second section focused on EFL teachers' frequency in using each of 9 applications. The third section identified the impact of 27 factors. The last section identified TPACK as a separate factor, which included 24 items around the seven TPACK constructs. It should be noted that these were the number of items after omission of missing data (see section 3.3.2, Chapter Three).

#### **4.3.1 Participant demographics**

The questionnaire collected self-reported data about participant demographics: gender, highest qualification, main area of specialization, age and years of teaching experience. Previous research has shown that these can have relationships with EFL teachers' use of



ICT. Findings from this section of the questionnaire are displayed in Table 10 and Table 11 below. Findings were organised in two separate tables because of the nature of the information obtained from the questionnaire. Findings on gender, highest qualification and main area of specialization were obtained from the choices that the participants made from the text menu, while findings for age and years of teaching experience were obtained from the numbers the participants actually wrote in as their answers.

Table 10 presents findings in relation to gender, highest qualification and main specialization and these are presented as descriptive statistics (percentages).

**Table 10** *EFL Teachers' Gender, Highest Qualification and Main Specialization*

	Gender		Highest qualification			Main specialization	
	Female	Male	Bachelor	Master	PhD	Language skills	Others
N	63	18	12	67	1	60	14
	77.8%	22.2%	15%	83.8%	1.2%	81.1%	18.9%
<b>Total</b>	81		80			74	

As can be seen from Table 10, most of the EFL teachers (n=81) were female (77.8%), with only a relative small percentage being male (22.2%). In relation to highest qualification (n=80, missing 1 case), the majority held a Master's degree (83.8%), some a Bachelor's Degree (15%), with very few (1.2%) having a PhD. In regards to Main specialization (n=74, missing 7 cases), a high proportion, some 81.1% taught Language Skills (such as listening, speaking, reading and writing) with the remaining 18.9% teaching Others (such as English Culture, Language Theories, English Literature and Translation and Interpretation).

Table 11 presents findings in relation to age and years of teaching experience, and these are presented as mean score, standard deviation and range.

**Table 11** *EFL Teachers' Age and Years of Teaching Experience*

	<b>Age</b>	<b>Years of teaching experience</b>
<b>Mean (SD)</b>	31.74 (7.023)	8.71 (7.023)
<b>Minimum-Maximum</b>	24 - 59	2 – 38
<b>N</b>	76	78

Table 11 shows that the average age of the EFL teachers (n=76, missing 5 cases) in this study was 31.74 (SD=7.023) and the average number of years of teaching experience (n=78, missing 3 cases) was 8.71 (SD=7.023). However, the teachers' ages varied from the minimum age of 24 to the maximum age of 59. Similarly, the number of years of teaching experience differed considerably, with the lowest being two years and the highest being 38.

Thus, most of the EFL teachers in this study were female, held a Master's Degree, taught Language Skills, and varied considerably in age and years of teaching. Only a few teachers were male and taught skills other than Language skills.

#### **4.3.2 Findings on Spearman Rhos**

Findings were then analysed to reveal possible relationships between variables in Section one, demographic information, and Sections two, three and four of the questionnaire. Again, I decided to calculate Spearman Rhos on the relationships, because this non-parametric technique is suitable for variables in the four questionnaire sections, which were all non-continuous variables. When doing so, I realised that in the data set around the 'Main area of specialization' variable, there were unequal numbers of respondents for

each sub-category such as Language Foundation Skills, GET and BEL, EAP, ESP, Language theories, Translation/Interpretation skills, English Culture and English literature. I, therefore, transformed this variable in SPSS into ‘Language skills’ (Language Foundation Skills, GET and BEL, EAP and ESP-n=60 ) and ‘Others’ (Language theories, Translation/ Interpretation Skills, English Culture and English Literature-n=14) where I assigned the values ‘1’ for ‘Language Skills’ and ‘2’ for ‘Others’ respectively.

Exploratory factor analysis conducted earlier revealed there were two ICT application Components: ‘ICT applications for teaching’ and ‘ICT applications for communicating’, (Section 2), three Components influencing EFL teachers’ ICT use namely, ‘Access & Provision’, ‘Institutional Culture’ and ‘Teacher Beliefs and Knowledge ’; (Section 3) and two TPACK Components ‘Technology-Related Knowledge Domain’ and ‘Non-technology Related Knowledge Domain’. The total scores for these Components were subsequently calculated (to prepare for the calculation of Spearman Rhos). The Spearman Rhos were then calculated. These are presented in Tables 12, 13, 14.

**Table 12** *Spearman Rhos for Teachers’ Demography and Use of ICT Applications*

	<b>Gender<sup>a</sup></b>	<b>Years of experience</b>	<b>Age</b>	<b>Main area of specialization<sup>b</sup></b>	<b>Highest qualification<sup>c</sup></b>
	N=81	N=78	N=76	N=74	N=80
<b>Use frequency of ICT for teaching</b>	.158	.293**	.302**	.399**	.243*
<b>Use frequency of ICT for communicating</b>	.368**	.344**	.333**	.351**	.110

\*p < .05, two tails, \*\* p < .01, two tails, <sup>a</sup>Gender: Female = 1, Male = 2, <sup>b</sup>Main area of specialization: Language skills=1, Others=2, <sup>c</sup>Highest qualification: Bachelor’s=1, Master’s=2, PhD=3.

Table 12 suggests with regards to the correlation between teachers' demography and the frequency of use of 'ICT applications for teaching' that there were statistically insignificant correlations between teachers' gender with frequency of use of the applications (with  $\rho$  being .158). In contrast, the correlations between the variables such as years of teaching experience, age, main area of specialization and highest qualification with the variable frequency of use of 'ICT applications for teaching' were statistically significant ( $\rho = .293, .302, .399, p < .01$  &  $.243, p < .05$ ). Results also show that these relationships were positive. These results thus indicate that the older the teachers were, and the greater number of teaching years they had, the more frequently they used 'ICT applications for teaching'. Also, teachers who taught other skills seemed to use 'ICT applications for teaching' more frequently than those who taught the four language skills. Finally, the higher the qualification they had, the more frequently they used 'ICT applications for teaching.'

In relation to the correlations between teachers' gender, teaching years, age, main area of specialization and their use of 'ICT applications for communicating', these correlations were found to be statistically significant and positive ( $\rho = .368, .324, .333$  &  $.351, p < .01$ , respectively). These findings show that in their self-report, male teachers tended to use these ICT applications more frequently than female teachers. Also, the older the teachers were and the greater number of teaching years they had, the more frequently they used 'ICT applications for communicating'. Again, teachers who taught other skills such as Language Theories, English literature, English culture, Interpretation/Translation skills seemed to use 'ICT applications for communicating' more than those who taught for the four language skills. Meanwhile, the relationships between teachers' highest qualification, and their use frequency of these ICT applications seemed to be statistically insignificant (with  $\rho$  being .110).

I now consider the relationship between Demographic Information and their perceptions on the impact of factors influencing their ICT use. Table 13 details the findings on Spearman Rhos.

**Table 13** Spearman Rhos for Teachers' Demography and Perceptions on Impact of Factors Influencing ICT Use

	<b>Gender<sup>a</sup></b> N=81	<b>Years of experience</b> N=78	<b>Age</b> N=76	<b>Highest qualification<sup>b</sup></b> N=80	<b>Main area of specialization<sup>c</sup></b> N=74
<b>Access &amp; Provision</b>	.130	.233*	.163	.171	.417**
<b>Institutional Culture</b>	.222*	.188	.133	.153	.291*
<b>Teacher Beliefs &amp; Knowledge</b>	.030	.004	-.055	-.013	.323**

\*p < .05, two tails, <sup>a</sup>Gender: Female = 1, Male = 2, <sup>b</sup>Highest qualifications: Bachelor's=1, Master's=2, PhD=3, <sup>c</sup>Main area of specialization: Language skills=1, Others=2

Table 13 shows that, in most cases, there were statistically insignificant correlations between the EFL teachers' gender, years of experience, age and highest qualification and such factor groups as 'Access & Provision', 'Institutional Culture' and 'Teacher Beliefs & Knowledge'. However, there were three exceptions. The first exception was the positive correlation between teachers' gender and the factor 'Institutional Culture'. The other two were the positive correlation between teachers' years of teaching experience and the factor 'Access & Provision' with Spearman Rho being .233 (p<.05), and the positive correlation between the teachers' main area of specialization with the three factor groups 'Access & Provision', 'Institutional Culture' and 'Teacher Beliefs & Knowledge' (ρ=.417, p<.01, ρ.291, p<.05 and ρ=.323, p<.01). It can be inferred that male teachers seemed to be more concerned about the impact of 'Institutional Culture' on their ICT use in classroom teaching. Also, the more years of teaching experience the EFL had, the more

they were aware of the impact of ‘Access & Provision’ factors on their use of ICT. Finally, teachers who taught other skills were more concerned with the impact of all factors belonging to ‘Access & Provision’, ‘Institutional Culture’ and ‘Teacher Beliefs & Knowledge’ groups.

Finally, the report considers the relationships between teachers’ Demographic Information and their TPACK. Table 14 is the focus of this part of the report.

**Table 14 Spearman Rhos for Teachers’ Demography and their TPACK**

	<b>Gender<sup>a</sup></b>	<b>Years of experience</b>	<b>Age</b>	<b>Highest qualification<sup>b</sup></b>	<b>Main specialization area<sup>c</sup></b>
	N=81	N=78	N=76	N=80	N=74
<b>Technology-Related Knowledge Domain</b>	.278*	.264*	.207	.043	.391**
<b>Non-technology Related Knowledge Domain</b>	.365**	.396**	.345**	.191	.512**

\*p < .05, two tails; \*\* p < .01, two tails, <sup>a</sup>Gender: Female = 1, Male = 2, <sup>b</sup>Highest qualifications: Bachelor’s=1, Master’s=2, PhD=3, <sup>c</sup>Main area of specialization: Language skills=1, Others=2

Table 14 shows, with regards to the relationships between teachers’ demographic information and their ‘Technology-Related Knowledge’ Domain, that there were statistically significant correlations between three of the variables, teachers’ gender, years of teaching experience and main area of specialization (with  $\rho$  being .278 & .264,  $p < .05$ ,  $\rho$  being .391,  $p < .01$  respectively). Also, these correlations were positive. It seems that male teachers tended to report having more ‘Technology-Related Knowledge’ than female teachers. Similarly, teachers with more years of teaching experience reported having more ‘Technology-Related Knowledge’. Also, teachers who taught other skills tended to report that they had more ‘Technology-Related Knowledge’ than those who

taught the four language skills. In contrast, the correlations between the variables such as age and highest qualification and this Knowledge Domain were statistically insignificant.

In relation to the 'Non-Technology Related Knowledge Domain', all the variables except highest qualification were found to have a statistically significant correlation with this knowledge domain ( $\rho$  being all  $>.3$ ,  $p <.01$ ). Also, these correlations were positive. It could be concluded that male teachers seemed to have more 'Non-Technology Related Knowledge' than female teachers. Also, teachers who were older and had more years of teaching experience tended to have more knowledge of this type. Similarly, teachers who taught skills other than the language skills had more 'Non-Technology Related Knowledge'.

In summary, findings on Spearman Rhos indicating correlations between teachers' demographic variables and 1) use frequency of ICT applications 2) perceptions on influencing factors to their ICT use, and 3) teachers' TPACK are as follows:

- Gender has positive correlations with the use of 'ICT applications for communicating', teachers' perceptions on the impact of 'Institutional Culture' factors and teachers' TPACK (both Technology-Related Domain and Non-technology Related Domain),
- Number of years of teaching has positive correlations with ICT use (for both teaching and communicating), teachers' perceptions on the impact of 'Access & Provision' factors, and teachers' TPACK (both 'Technology-Related Knowledge' Domain and 'Non-technology Related Knowledge' Domain),
- Age has positive correlations with ICT use (for both teaching and communicating) and teachers' 'Non-technology Related Knowledge' Domain,

- Highest qualification has positive correlations with teachers' use of 'ICT applications for teaching'.
- Main area of specialization has positive correlations with ICT use (for both teaching and communicating), with teachers' perceptions on the impact of three groups of factors 'Access & Provision', 'Institutional Culture' and 'Teacher Beliefs & Knowledge', and teachers' TPACK (both 'Technology-Related Knowledge' and 'Non-technology Related Knowledge Domain').

Thus, these demographic variables of the EFL teachers such as gender, years of teaching experience, age, highest qualification and main area of specialization seemed to be complex variables when it comes to studying the relationships between these variables and teachers use of ICT, their perceptions on the impact of the factors, and their TPACK.

#### **4.4 Chapter summary**

This chapter has presented self-reported data obtained from a questionnaire and semi-structured interviews with the EFL teachers at Hanoi University separately. The findings were organised around the three research questions regarding ICT applications used by the EFL teachers, the influence of factors on teachers' use of ICT in classroom practice, including teachers' TPACK, and relationships between teachers' demographic features such as age, gender, years of teaching, highest qualifications and main subject taught with their use of ICT, with their awareness of the impact of the factors and with their TPACK. In the next chapter, Chapter Five, the findings will be integrated and discussed in relation to the literature within the framework of the research questions.



## **Chapter Five: Discussion**

In this chapter, I discuss the findings reported in the previous chapter in relation to the research questions. I begin by discussing EFL teachers' use of ICT applications in their classroom teaching. I then discuss the impact of factors that influence this use, including TPACK. For these two parts, I integrate findings from both the questionnaire and interviews that were reported on separately in the previous chapter. Next, I discuss the relationships between the teachers' demographic features such as age, gender, years of teaching experience, main area of specialization, highest qualifications and their use of ICT, their perceptions on impact of factors, including TPACK. It should be noted that most of this discussion draws from the questionnaire. This is followed by a discussion on the complexity in ICT use. This chapter ends with an overall discussion.

### **5.1 ICT applications**

This part of the chapter is concerned with ICT applications employed by the EFL teachers in their classroom teaching. It is apparent from the questionnaire data that the EFL teachers in this study often used both general types of ICT applications such as 'Power Point' and 'Word-processor', as well as certain language-specific ICT applications such as 'Electronic dictionaries' and 'Digitized audio/video'. Yet, the use of other language-specific applications, such as 'Tutorials and drills', 'Word-recognition software' and 'Web-based activities' by these teachers was not as high. This suggests that the level of use of these applications might vary.

Of interest is that a big number of teachers indicated they had never used such applications as 'Audio/Video conferencing' and 'Voice chat' (applications for communicating). This is somewhat surprising given that the availability of these technologies could constitute them as generic type applications. One possible reason for this disparity is that the EFL teachers taught face-to-face so they had no pressing need to

use ‘Voice chat’ and ‘Audio/Video conferencing’. Another possibility relates to the teachers’ tendency to associate technologies only in relation to their own use as teachers. As such, it is likely that even if they encouraged students to use the applications, they would not register this as their own use.

In the interviews, the teachers also reported using multiple ICT applications in their classroom teaching, including both common applications such as ‘Power Point presentation’, ‘Email’ and some language specific applications such as ‘Audio/video and ‘Pronunciation software’. Also, it seems that when using generic applications, they adapted them to suit their EFL classes, indicating their purposeful selection, adaptation and use. This suggests that these teachers had a relatively comprehensive knowledge about ICT applications, including the generic ones. However, they might be selective in using certain ICT applications for their classroom teaching.

When it comes to the purpose of using ICT, the questionnaire findings show that teachers used them mainly for teaching and communicating purposes. The interview findings shed some further light, suggesting that tools were selected to enable content delivery, information display or communicating with students. Thus, it would seem that these teachers were selecting tools to aid their instruction and to “make their current jobs quicker and easier” (Jordan, 2011, p. 16), and that their use of ICT was just “layering ICT” (Carr, 2013, p. 149) onto their current teaching practices. This is nothing new. The literature has shown that a ‘tool view’ is commonly held (Jordan, 2011; Keengwe & Kang, 2013; Kim, 2008; Li & Ni, 2011; Park & Son, 2009).

In the interviews, participants gave various reasons for using ICT. Some of these such as their perception that there were particular benefits and that they thought their students needed to, are well reported in the literature (Albirini, 2006; Celik, 2013; Dinh, 2009; Dang, 2014; Kim, 2008; Li & Ni, 2011; Mollaei & Riasati, 2013; Park & Son, 2009;

Saglam & Sert, 2012). However, some participants also indicated that they used ICT as they were mandated by the university to do so. This suggests that some teachers felt somewhat coerced, rather than using ICT for pedagogical reasons. Thus, the findings indicate that the teachers' implementation of ICT in classroom teaching could be both optional and compulsory. This is discussed in further detail in part four of this chapter.

However, a number of participants implied in the interviews that the teachers used ICT more than the students, and that teachers had some control over the use of ICT in their classroom practice. Such comments as that by Valerie that "*ICT gives us a choice – it is up to the teachers to use ICT*" clearly illustrate this trend. It seems that the EFL teachers had control of what to teach and whether or not to employ ICT to teach in order to achieve their instructional goals. There seems to be little room for the students to interact with their teachers and with their peers via the use of ICT in their learning process.

An understanding of the Vietnamese teaching system and tradition could assist in understanding this. In terms of the teaching system, the national education system "prescribes almost all of school operation practice" (T. T. Dang, 2010, p. 5) including academic activities, so the EFL teachers had to follow a fixed syllabus and thus had little space to implement ICT in their practice. Also, being affected by the Confucian heritage (see Introduction Chapter), Vietnamese teachers are traditionally considered knowledge providers and so they are the centre of the learning process (T. T. Dang, 2010). This applies to Vietnamese EFL teachers as well. Recently, a communicative language teaching method that put students in the centre of the learning process has been used in many educational institutions, but the effectiveness of this approach is not "consistently reported to be effective" (T. T. Dang, 2010, p. 5). As a result, the EFL teachers tended to stick to their traditional teaching methods, and used ICT in classroom instruction in a

manner that went hand-in-hand with the traditional approach, which is a more teacher-centred approach.

Another reason might be that the political and economic conditions in the 1980s and 1990s led to the assumption of the central role played by teachers in a classroom (T. X. Dang, 2014). Before 1986 when Vietnam implemented its *doi moi* policies, and before 1993 when the US lifted its economic sanctions against Vietnam (see Chapter One), there seemed to be a shortage of learning resources in Vietnam. This resulted in student reliance on their teachers in terms of learning resources and teachers became main resource providers (T. X. Dang, 2014). Because of this, teachers are considered the centre of the teaching process. As previously mentioned, because ICT implementation is relatively new in Vietnam, possibly Vietnamese teachers, including the EFL teachers in this study, continued with a more teacher-centric view when attempting to use ICT in their classrooms. As a result, the teachers used ICT more than students, as a tool to support for their teaching.

It can also be seen that ICT was not fully integrated in their classroom teaching at Hanoi University, and this finding is not that surprising given that this is also the case in Western countries (Cuban, 2001; Groff & Mouza, 2008). This indicates that a certain gap between ICT-related policies and teachers' practice could exist in any country, regardless of its economic position.

This part of the chapter has discussed the integrated findings from a questionnaire and interviews with the EFL teachers at Hanoi University in relation to the ICT applications they employed in their classroom teaching. Discussion now turns to research question two, the impact of factors on the EFL teachers' use of ICT.

## **5.2 Impact of factors influencing teacher use of ICT**

This part of the chapter is concerned with how particular factors impacted on the EFL teachers' use of ICT in this study. In recent times, the literature has been interested in identifying factors influencing teacher use of ICT, as part of the recognition that teacher use of ICT is complex, and is not just a simple matter of putting technology in place. Even though at times the discourse that put forward was a techno-centric view, there is growing awareness that it is complex (Jordan, 2011; Mishra & Koehler, 2006).

Previous research has also spent a great deal of time trying to identify and categorise these factors as barriers and enablers, in response to specific agendas. This study with its own goals has provided a lens to look at the complexity of teacher use of ICT through a summary representation of the factors influencing this use.

This study attempts to discover which factors have greatest impact on the teachers. It was set in a particular context, Vietnam, at a university where policy documents (at national level and university level) stipulated that ICT should be used, which is more-or-less the top down approach where ICT use was expected. What was missing from these documents, however, was a more complex view of how to integrate ICT. Indeed, it seems to be assumed that teachers would readily integrate ICT into their practice if they were provided with technical equipment, and if they had to work towards achieving ambitious goals set out in the policy documents.

### **5.2.1 Impact of broad sets of factors**

#### ***5.2.1.1 Teacher-related factors***

Previous research has suggested that the role of the teacher is important when it comes to using ICT or not (BECTA, 2004; Ertmer et al., 1999; Groff & Mouza, 2008; Hew & Brush, 2007; Mumtaz, 2000; Zhao et al., 2002). This study found that the teacher is the most important factor. In particular, teachers' 'Beliefs in ICT benefits in EFL teaching'

and ‘Knowledge and skills in using ICT to teaching EFL’ had the biggest impact on their ICT use in this study. The findings thus consolidate previous research studies on teachers in general in relation to the importance of their attitudes and beliefs (BECTA, 2004; Mumtaz, 2000; Nyambane & Nzuki, 2014; Yildiz, 2007), and the importance of their knowledge and skills in their use of ICT in classroom practice (Groff & Mouza, 2008; Hew & Brush, 2007; Mumtaz, 2000; Park & Son, 2009).

Although the reasons why the teachers indicated that they themselves had the most important role in using ICT were not the feature of this study, it would be interesting to investigate further to see if there could be a teacher-centric view that reflected the broader Confucian tradition of the central role of the teacher (T. X. Dang, 2014; Do, 2006), or if there could be other reasons.

When it comes to teachers’ beliefs in ICT benefits from the interview findings, the EFL teachers provided more detailed awareness on the various benefits of ICT in their EFL classroom instruction. This included that ICT makes lessons more interesting, more motivating for students, that ICT brings new ways of teaching English, delivers authentic English, facilitates communication between teachers and students, to name a few. Interview findings also show that two teachers (Mary and Judy) stated that although not required to by the department, they voluntarily implemented ICT in their classroom teaching because of their awareness about its benefits (see Section 4.1.2, Chapter Four).

Compared to previous research on EFL teachers specifically, the interview findings on EFL teachers’ beliefs in the benefits of ICT in their classroom instruction are different from Lam’s (2000) and Ma and Yuen’s (2002) findings, but are similar to Dinh’s (2009), Dang’s (2014), Li and Ni’s (2011), Park and Son’s (2009) and Saglam and Sert’s (2012) studies. Lam (2000) and Ma and Yuen (2002) have highlighted that the EFL teachers in their studies needed to be convinced about the benefits of ICT in classroom practice. In

contrast, Dinh (2009), Dang (2014), Li and Ni (2011), Park and Son (2009) and Saglam and Sert (2012) stated that the language teachers in their studies had positive attitudes about the benefits of ICT. This study shows that the EFL teachers in this study were already aware of the benefits, so there might be no need to convince them about ICT benefits to their classroom teaching.

It was possible that the time that elapsed between Lam's (2000) and Ma and Yuan's (2002) studies, and Dinh's (2009), Dang's (2014), Li and Ni's (2011), Park and Son's (2009) and Saglam and Sert's (2012) and this study caused the differences in the findings. During this time, technology has been increasingly infused into everyday life, into education in general and into language education in particular. The more teachers are exposed to ICT, the more they become aware of ICT benefits in their classroom practice. In considering this, perhaps it is reasonable to say that at this stage, research could focus on how to turn teachers' positive beliefs in the benefits of ICT into their actual application of ICT in teaching to its full potential, rather than on how to persuade the teachers that ICT is beneficial to their classroom instruction.

With regard to teacher knowledge and skills in relation to their use of ICT, in the interviews, the teachers detailed the impact of their knowledge of the English language on their self-learning about ICT. This is discussed further in section 5.2.1.5 of this chapter.

Finally, in relation to teacher knowledge and skills conceptualised by the TPACK framework (Mishra & Koehler, 2006), it is clear from the questionnaire that teacher TPACK had a positive correlation with their use of ICT in classroom practice (Section 4.2.5.2, Chapter Four). It can be seen that the more TPACK the EFL teachers had, the more likely it was that they would use ICT for classroom instruction. Thus, while previous research on teacher knowledge and skills show that generally this might be a factor influencing their use of ICT (Groff & Mouza, 2008; Hew & Brush, 2007; Mumtaz,

2000; Zhao et al., 2002), this study moves one step further. This is because this study indicated that teacher knowledge and skills could be conceptualised by the TPACK framework (Mishra & Koehler, 2006), rather than by a techno-centric view that focused only on the technical competence of the teachers (Albirini, 2004; Albirini, 2006; Aydin, 2013; Bingimlas, 2010; Chen 2008b; T. X. Dang, 2014; Gorder, 2007; He, Puakpong, & Lian, 2013; Mollaei & Riasati, 2013; Park & Son, 2009); and that teacher TPACK could have a relationship with their actual use of ICT in their teaching practice. It is important though to replicate this study in different settings to see if this is the case in other contexts.

#### ***5.2.1.2 Student-related factors***

The impact of the student on teacher use of ICT seemed to be less clear. The questionnaire data showed that the teachers perceived that the impact of the students varied. This is reflected in differences in the ratings of the impact of ‘Student motivations to use ICT’, ‘Student technical knowledge and skills’, ‘Teacher beliefs that students with good skills can help’, and ‘Student prior experience to use ICT’. The findings, however, support Groff and Mouza’s (2008) view that students might be a factor that influences teacher use of ICT.

The interviews seemed to shed further light on some questionnaire findings. Some of the teachers indicated that they used ICT as a motivator for student learning (Mary), and they used ICT because they thought that the students needed it (Cindy). In relation to ‘Students’ technical knowledge and skills’, some teachers said that if students lacked technical knowledge and skills, they tended to rely on their teachers for assistance (Mark). In contrast, if students had better technical knowledge and skills, the teachers would see this as a motivation to study more to catch up with their students (Cindy and Judy).



Thus it can be seen that there was a gap in students' technical knowledge and skills in using ICT to learn English. This had an impact on the EFL teachers' use of ICT in their classroom teaching in that, on the one hand, the teachers needed to assist students with limited technical knowledge, and, on the other hand, the teachers needed to learn to develop professionally in order to catch up with their students who had better technical knowledge and skills. It appears that in their ICT use, the EFL teachers at Hanoi University had to bear two-fold responsibilities towards their students and towards themselves. This shows that teachers' ICT use is a complex process that needs to be researched thoroughly (Mishra & Koehler, 2006).

Of interest is that two of the teachers interviewed (Mark and Cindy) clearly indicated the connections between the students' technical knowledge and skills and their ICT use in terms of their choice of pedagogy. They emphasised that if the teaching approach was student-centric, students' technical knowledge and skills would then have an important impact. In contrast, when the teaching approach was teacher-centric, the students' technical knowledge and skills did not seem to have any impact.

The findings also show that a number of EFL teachers had a receptive attitude toward their students when they used ICT for classroom instruction. Their receptiveness is reflected in their perceptions that students with better technical knowledge and skills motivated them to learn to catch up with their students. It appears that these teachers did not think of themselves as the 'expert' (Lam & Lawrence, 2002, p. 296), which was normally considered the traditional role of the EFL teachers. Instead, it seems that some of the EFL teachers in this study were aware of the required change in their role, which is "the decentralisation of the teachers" (Lam & Lawrence, 2002, p. 311) when ICT is used. As argued by Lam and Lawrence (2002), this change is necessary because the students will then be given chances to work more collaboratively with their peers to construct their

own knowledge, and the teachers will have more opportunities to attend to individual needs of their students, thus the teachers can shift toward a more learner-centred teaching approach.

Coupled with this receptiveness is the teachers' awareness of the differences in the teaching approaches adopted when they incorporated ICT in their classroom instruction. As can be seen, some of the EFL teachers in this study (Mark and Cindy) have demonstrated their perceptions of both a teacher-centric and a student-centric teaching approach.

In addition, interview data shows that some teachers, such as Mark, have reported using students with good ICT skills as an aid. This finding expands Li and Walsh's (2011, p. 117) perspective that teachers "need to realize that students should play an active part" in their use of ICT for classroom teaching. On realizing this potential, some teachers in this study actually used students with good knowledge and skills as an aid in their ICT integrated instruction. The findings are also congruent with what Hellen (1999, p. 21, cited in Lam & Lawrence, 2002, p. 298) observed in a technology-integrated classroom that "usually students do more helping of teachers than the other way around in this room".

Finally, a number of the teachers interviewed provided detailed reasons why 'Students' prior experience' had a small impact. The reasons were that the subject they taught did not require them to use much ICT, that students had time to prepare ICT-related tasks, and that they could seek assistance from the teachers and the technicians during the preparation process. Thus it seems that to a number of teachers, their use of ICT depended on the subjects that they taught. This also suggests that the students needed time to prepare for ICT use in their own learning, but there seemed to be a reliance on their teachers and technicians for support in preparing to use ICT for learning.

### *5.2.1.3 Technician-related factors*

Like the student-related factors, the impact of factors concerning technicians was not clear. In the questionnaire, there was a big difference in the rating that the factors ‘Having on-site technical support’ and ‘Having after-hours technical support’ received in terms of their impact. However, the findings are similar to previous research that suggested that technical support might be an influencing factor to teacher use of ICT (BECTA, 2004; Dinh, 2009; Hew & Brush, 2007; Hu & McGrath, 2012).

In the interviews, four teachers indicated that they used ‘On-site technical support’ when they had technical problems that they could not solve themselves. Notably, one teacher (Cindy) reported that her need for on-site technical support would depend on whether she used the technical resources at university or was using her own equipment such as her laptop. If she used university equipment, she would call the technicians in case of technical breakdowns. In contrast, if she used her own laptop, she would then not need the assistance of the university technicians.

In addition, six of the teachers interviewed reported not using ‘After hour technical support when needed’. The reasons cited by the teachers were that they did not know about the support and that some of them would rather ask friends/relatives. Only one teacher (Mark) used this service because of his personal contact with the technicians, and for mutual benefits (see Section 4.2.3.4, Chapter Four). Zhao et al. (2002, p. 494) referred to a type of essential knowledge that teachers must have in the school system where technology is implemented, which they termed “social awareness”. This is the knowledge of “where to go for what type of support and [being] attentive to peers”. It can be seen that the majority of the EFL teachers interviewed did not show this social awareness in the university in relation to technical support, except for Mark, who indicated that he interacted with the technicians for technical support in the university system.

The findings thus paint an interesting picture of the university in terms of technical support and resource provision. First, the EFL teachers seemed to attempt to fix technical problems themselves before consulting the technicians; second, the type of technical support might not meet the expectations of the teachers, so they tended to use this support as a last resort. Third, there seems to be issue with equipment provision at the university, which is why some teachers had to use their own equipment for classroom teaching. The EFL teachers at Hanoi University seemed to display a certain amount of independence in dealing with technical problems and problems related to the provision of resources at the university.

#### ***5.2.1.4 Peer-related factors***

When it comes to peer-related factors, the questionnaire data indicated that colleagues did not seem to have an important impact on the EFL teachers' use of ICT in classroom practice. All three of the listed colleague-related factors such as 'Colleagues' willingness to share teaching resources', 'Colleagues' commitments to using ICT' and 'Colleagues' help in using ICT' were in the lowest and second lowest groups of ratings in relation to their impact on teachers' use of ICT.

Yet, in the interviews, all seven teachers reported that their peers were willing to share ICT resources and exchange ideas on ICT utilisation for classroom instruction. Although some teachers thought that peer use of ICT may exert pressure on them, they tended to think of the pressure as motivation for them to learn and to apply ICT in their classroom practice.

Most of the teachers in the interviews also reported on using their peers for informal professional development in terms of ICT use. The findings agree with Egbert et al.'s (2002) and Aydin's (2013) research studies in that colleagues are commonly cited as a source for idea exchange during the ICT use process by teachers. The findings also

emphasise the importance of teacher “social awareness” (Zhao et al., 2000, p. 494) as a factor influencing their ICT use. The EFL teachers’ “social awareness” is reflected in that they seemed to know who to interact with for ICT-related professional development, in this case, their colleagues, so they could begin implementing ICT in their classroom practice.

Although it is not certain in this study whether the university officially provided EFL teachers with opportunities for collaboration with their peers during the ICT implementation process, which, according to Chen (2008b, p. 1025), is very important for language teachers to obtain “emotional support and to overcome frustration”, the findings do indicate a willingness among the teachers to learn from their peers and a willingness by the teachers’ peers to share ideas through interpersonal channels (Rogers, 2003), such as talks during the breaks among the teachers (as Judy has commented).

#### ***5.2.1.5 Administrator-related factors***

When it comes to administrator-related factors, it is apparent from the questionnaire findings that although the EFL teachers were concerned about their knowledge ‘of where to look for support’, they were not concerned about ‘Financial support from the university’. This is because while the former factor received the third highest mean rating in terms of the impact on teacher use of ICT, the latter received the lowest rating.

Similarly, the teachers were not very concerned about the impact of such factors as ‘Professional development opportunities’, ‘Clear guidelines’ and ‘Knowing that ICT use required by the department’. These factors did not receive very high ratings in terms of their impact on teacher use of ICT (see Section 4.2.1, Chapter 4). However, the teachers were more concerned with ‘Provision of teaching resources by department’, because this factor had a higher mean rating.

The interviews with seven teachers corroborated the questionnaire findings on this aspect by providing details about a lack of professional development opportunities, a lack of administrative support and clear guidelines. First, the interview findings showed that at the university, there was virtually no professional development provided to the teachers, except for some technically-oriented small workshops. However, these small workshops did not provide teachers with the teaching pedagogy around ICT, which was what the teachers thought they needed. Furthermore, administrative support involved only posting announcements on the department website. The findings thus imply a ‘techno-centric’ philosophy underlying the support provided to teachers in relation to ICT because the type of support was mostly technology-oriented.

In response to this, some EFL teachers used their friends and colleagues as the main source of professional learning. They also tried to do some self-learning. Interestingly, in the process of self-learning, some teachers saw their English language knowledge as having a positive impact on their use of ICT, because this type of knowledge helped them understand technical documents and access teaching resources in authentic English. Thus it can be seen that the teachers in this study considered their English language knowledge as an advantage in learning to use/using ICT in their classroom teaching. This study, therefore, adds to the literature that the EFL teachers’ knowledge about English language might be an enabler to their ICT use.

Next, interview findings indicate that currently at the university, virtually no ICT-related guidelines/regulations were made known to them. The findings illustrate a common issue identified in previous research studies, that is, while putting government ICT-related policies into specific contexts of schools or universities is one important aspect of leadership support, often, this is “underperformed” (Carr, 2013, p. 179).

Finally, interview information on the impact of the factor ‘Provision of teaching resources by the department’ seems to be somewhat contrasting. On the one hand, the teachers indicated that the lack of resources resulted in not all EFL teachers using technologies (Valerie). On the other hand, some resources provided by the university, such as projectors, were reported to be overused and some, such as videos, were underused (Mary), and some resources were wasted at the university (Valerie). The findings point to the complicated issue of resource provision, and thus confirm that the mere purchase of software and hardware by the university cannot guarantee ICT uptake by EFL teachers (Bax, 2003). It was possible that while the university invests in hardware and software, this was merely investment on generic technology instead of specific technology, which is beneficial to EFL teaching and learning. That is why, although there were available resources, the teachers still felt the resources were lacking. This could be understood as the lack of relevant resources for EFL teaching as perceived by the teachers.

Nearly 14 years ago, Cuban (2001) referred to this issue as “oversold and underused computers” in education. This study confirms the currency of Cuban’s perspective at present. Yet the findings also expand Cuban’s (2001) perspective of the issue of ‘over-equipped and under-used ICT’ at the university. The ‘over-equipped’ issue could be understood as investment in software and hardware or technological infrastructure by the university without considering how the EFL teachers would use the applications in their classroom. The consequence is that the teachers cannot use the ICT applications provided by the university to their full potential in classroom instruction, and to make things worse, the teachers complained about a lack of resources provided by the university.

### ***5.2.1.6 Technology-related factors***

In relation to technology-related factors, it is apparent from the questionnaire data that the teachers were concerned about whether the ICT applications were relevant to the curriculum, whether they had enough time to prepare lessons, whether the ICT applications were relevant to their teaching practice, and whether they had access to reliable technology for use in English teaching.

In the interviews, the teachers were particularly concerned about access to reliable technology. They clearly indicated that although they attempted to use ICT in their classroom teaching, a lack of facilities and technical problems often hindered these attempts. In other words, these two factors appeared to be hindering factors. This study thus consolidates previous research, which identified a lack of facilities and unreliable technology as barriers to teachers' use of ICT (BECTA, 2004; T. X. Dang, 2014; Dinh, 2009; Park & Son, 2009; Sumi, 2010; Yildiz, 2007).

### **5.2.2 Interactions among the influencing factors**

In an attempt to explore the associations among the factors influencing teacher use of ICT, I ran exploratory factor analysis on the questionnaire findings on the factors. It was revealed that from the EFL teachers' perspective, the factors influencing their use of ICT in classroom practice could be grouped into three categories. I labelled the categories as 'Access & Provision', 'Institutional Culture' and 'Teacher Beliefs & Knowledge', based on some common elements among the factors that made up each category.

First, the 'Access & Provision' category was so named because all the factors belonging to this category referred to something external that existed out of the teacher control, and something that must be provided for. This category included factors around access to professional development, access to technological resources such as reliable technology, enough computers for students, a computer lab when required, access to clear



guidelines, and provision of different types of support such as financial support, on-site technical support, after-hours technical support, administrative assistance, a syllabus that supported the use of ICT and provision of teaching resources (see Section 4.2.2, Chapter Four). It seems that the teachers in this study would like everything to be easy for them when attempting to use ICT in their classroom teaching.

The literature shows that most often the concept of access refers to “access to computers and software” (Ertmer et al., 1999, p. 54), “access to resources” (BECTA, 2004, p. 10) including hardware, enough computers for students, and software, “access to hardware and software” (Groff & Mouza, 2008, p. 27), “accessibility of ICT resources such as hardware or software” (Nyambane & Nzuki, 2014, p. 10), or “access to computers’ (Zhao et al., 2002, p. 512). This study found that access did not mean merely access to technological resources, but rather, access to technological resources plus access to professional development and access to clear guidelines. It thus suggests that access should be defined more broadly. Also, unlike previous research, the teachers in this cohort seemed to be aware that access should line up with provision. The reasons for this are not a feature of this study, but might be worth further investigation in the future.

Next, the ‘Institutional Culture’ category was so named because this category included the items that referred to the culture of ICT implementation of an institution. This category encompassed one teacher-related factor, teacher commitment to using ICT, peer-related factors such as peer support, peer sharing resources and peer commitment, student-related factors, namely, student assistance and student prior experience, and one administrator-related factor, ICT use as required by the department. It can be seen that in this category, the peer had associations with the teacher, the student, and the administrator. This is different from previous studies, which often categorised peer support as a factor belonging to the context (Groff & Mouza, 2008), or interaction with

peers as part of teacher knowledge about the successful conditions for technology integration, which is termed teacher “social awareness” (Zhao et al., 2002, p. 494). The findings thus suggest that categorising and fitting the factors into relevant categories might be difficult because of the complexity around the factors influencing teacher use of ICT.

In addition, the ‘Teacher Beliefs & Knowledge’ category consisted of teachers’ beliefs about the relevance of ICT applications to the curriculum and their teaching practice, beliefs about the benefits of ICT, beliefs about student motivations and student technical knowledge, as well as knowledge about using ICT to teach English and knowledge of where to look for support. It could be seen that in this category, teacher beliefs relate to their knowledge. This is different from Hew and Brush (2007), who categorised teacher beliefs separately from teacher knowledge, but similar to Groff and Mouza (2008) who put teacher beliefs and knowledge in the Innovator group.

In the interviews, the factors influencing teacher use of ICT were categorised into six categories: teacher-related factors, student-related factors, peer-related factors, technician-related factors, administrator-related factors and technology-related factors. These were a common way of categorising the factors in the literature as shown in the summary representation of the factors (see Section 2.2.7, Chapter Two). This was done also because of the design of this study. This study employed a convergent design, so collecting data by way of questionnaire and interviews was carried out at the same time. After being collected, the questionnaire data were analysed using exploratory factor analysis to investigate the interactions among the factors. At the same time, the interview findings were analysed based on what was revealed in the literature, such as the categorisation of the factors into the six broad groups identified above.

Thus, the result of exploratory factor analysis and the naming of different categories of the factors for the questionnaire data, as well as a different categorisation of the factors for the interview findings as discussed above could reflect issues around categorisation and sub-categorisation of the factors influencing teacher use of ICT, identified as an issue in the research literature (see Section 2.2.2, Chapter Two). The fact that researchers, including me, define and categorise things differently due to different research methods and agendas might compound the research literature. However, this study has enriched the research literature by providing evidence to reinforce the complexity around teacher use of ICT and the factors influencing this use.

This section has discussed the integrated findings from the questionnaire and interviews in relation to the impact of the factors on teacher use of ICT. The next section discusses the findings with regards to teacher TPACK.

### **5.2.3 Teachers' TPACK**

This section is concerned with teachers' TPACK as an important factor influencing their use of ICT in classroom teaching. As argued in the Literature Review chapter, the TPACK framework was conceptualised by Mishra and Koehler (2006), based on Shulman's (1986, 1987) idea of Content Knowledge, Pedagogical Knowledge and Pedagogical Content Knowledge. The TPACK framework has proved to be an influential framework in understanding the types of knowledge that a teacher needs to have in order to teach with technologies. It is also argued that many researchers have attempted to measure teachers' TPACK, and to understand the impact of teachers' demographic features such as age and gender on their TPACK. However, there are issues in defining the TPACK constructs and their operation.

Recently, there has been acknowledgement of the importance of CK with researchers such as Harris and Hofer claiming that all contents are different or unique, and that the

particular CK must be identified. As a result, there has been an interest in developing activity types associated with a discipline such as Maths or Physical Education, but little has been done in relation to EFL. In response, this study developed definitions of seven TPACK constructs of an EFL teacher. This was done to develop a questionnaire instrument to measure the EFL teacher TPACK in this study.

The discussion of the integrated findings from the questionnaire and interviews on teachers' TPACK is organised around three themes: the EFL teachers' self-assessed TPACK, associations and boundaries among the seven TPACK constructs, and the TPACK framework in reality.

#### ***5.2.3.1 The EFL teachers' TPACK***

The integrated findings from the questionnaire and interviews on the EFL teachers' TPACK show that, generally speaking, there was agreement between the two sets of data. The questionnaire findings indicate that in the EFL teachers' assessment, higher levels of knowledge were reported in relation to PK, PCK and CK, than for TK, TCK, TPK and TPACK. Similar to the questionnaire findings, the semi-structured interviews show that often CK and PK were more important than technology-related knowledge.

The findings are similar to Archambault and Crippen (2009) and Jordan (2011). Archambault and Crippen (2009) stated that teachers had the most confidence in relation to their Pedagogical Knowledge (PK). Jordan (2011, p. 22) concluded that teachers had "more confidence in Content Knowledge (CK)". The findings also confirm what Archambault and Crippen (2009) found in their study that, when using ICT, teachers seemed to perceive that they were strong in their subject knowledge and teaching ability. The reasons for this might be that because when they were still student-teachers, the EFL teachers in this study received education/training that focused more on English subject knowledge, which was influenced by the spoon-feeding teaching method, with foci on

grammar-translation methods (Tran, 2009). As Niederhauser et al. (1999, p. 157, cited in Wang, 2002, p. 154) pointed out “Teachers’ instructional beliefs are often firmly entrenched...because of their experiences as students in traditional classrooms”. Another explanation might be that the implementation of ICT in EFL teaching at Hanoi University in particular and in Vietnam in general was relatively new, so in this process, the EFL teachers were more likely to stick to the non-ICT teaching tradition that they were used to, which focused more on the subject knowledge.

Furthermore, exploratory factor analysis on the EFL teachers’ TPACK obtained from the questionnaire shows that, different from the conceptualization of the TPACK as having seven constructs, there were only two domains of TPACK: Technology-Related Knowledge and Non-Technology Related Knowledge. Similarly in the interviews, the teachers could only provide information on their knowledge of English and pedagogy of teaching English, and their technical knowledge. These integrated findings indicate that, on the one hand, the EFL teachers in this study could only differentiate between knowledge to teach with technology and knowledge to teach without technology. On the other hand, these teachers perceived that knowledge to teach English with technology seems to be a specialised type of knowledge, which might exist separately from their knowledge of teaching English without technology in a traditional way. Thus, it can be seen that similar to previous studies (Archambault & Barnett, 2010; Archambault & Crippen, 2009), the teachers in this study faced the same confusion about how to define and categorise items belonging to different TPACK constructs.

#### ***5.2.3.2 Associations and boundaries among the seven TPACK domains***

Another important point that is worth noting is in relation to the EFL teachers’ perceptions about their seven TPACK constructs and associations among these constructs. The findings from exploratory factor analysis showed that one domain, the TK

did not have any associations with the remaining six domains. Yet, there were underlying trends in the remaining six knowledge domains in that the three TCK, TPK and TPACK were grouped into the Technology-related Knowledge Group (TKG), and all CK, PK and PCK domains were categorised into the Non-Technology related Knowledge Group (NTKG).

The findings are different from what was initially conceptualised by Mishra and Koehler (2006), which gave equal weight to the seven TPACK domains, and claimed that these seven domains were connected. In this study, the EFL teachers perceived that there were two big groups of TPACK, and that only six TPACK domains except for the TK had interconnections. The findings, however, confirm the complexity of teachers' knowledge when integrating ICT in their instruction as emphasised by Mishra and Koehler (2006), in that more than one type of knowledge might be needed by the teachers to use ICT in their classroom instruction.

The findings thus disagree with the 'techno-centric' view that mastering technology skills only is enough for teachers to be able to use ICT in their classroom practice. It is obvious in this study that the EFL teachers perceived technology skills (TK) as having no connection with other types of knowledge. Therefore, this study questions "the use of technological one shot solution" (Chamber & Bax, 2006, p, 477) in the implementation process, or "stand-alone technology courses" (Hughes & Scharber, 2008, p. 95) provided to the teachers for professional development.

Finally, the findings also confirm that the boundaries among different TPACK constructs are not clear. Thus, as suggested by Angeli and Valanides (2009) and Archambault and Barnett (2010), further clarification of each knowledge domain should be carried out if "TPACK is to be considered as an analytical theoretical framework for

guiding and explaining teachers' thinking about technology implementation in teaching and learning" (Angeli & Valanides, 2009, p. 157).

### ***5.2.3.3 TPACK in reality***

When compared with previous studies on teacher TPACK, findings from the exploratory factor analysis of the two TPACK groups (Technology-Related Knowledge and Non-Technology Related Knowledge) in this study were different from previous studies. For example, factor analysis used to analyse patterns in teachers' TPACK in America by Archambault and Barnett (2010) revealed that there were three factors instead of seven factors. These three factors included non-technology construct (CK, PK and PCK), technology construct (TCK, TPK, TPACK) and a single TK construct. Also, Koh et al.'s (2010) study with pre-service teachers in Singapore, using the adapted survey tool by Schmidt et al. (2009), showed that the teachers' TPACK had five domains: Technological Knowledge (TK), Content Knowledge (CK), Knowledge of Pedagogy (KP), Knowledge of Teaching with Technology (KTT) and Knowledge from Critical Reflection (KCR). In contrast, some research studies were able to validate the seven TPACK constructs. For example, Koh et al.'s (2013) study, which investigated 869 pre-service teachers' TPACK in Singapore using an adapted survey tool on TPACK, revealed that there were seven TPACK factors from factor analysis corresponding to the seven TPACK constructs. These different findings suggest two possibilities about the existence of TPACK, that is, either the TPACK framework might not exist in reality, or although the TPACK might exist in reality, it "might be a temporary concept" (Hughes & Scharber, 2008, p. 89). This is discussed further below.

First, findings from this study highlight the possibility that the TPACK framework might not exist in reality. This is because, similar to a number of previous research studies conducted in different countries (Archambault & Barnett, 2010; Koh et al., 2010),

this study from a Vietnamese context has failed to obtain the seven knowledge constructs belonging to the TPACK framework through factor analysis. As a result, more research is needed to further validate the framework in reality, to confirm its existence, or perhaps to redefine it.

Yet, research to validate the framework will face the dilemma of constructing relevant tools to measure teachers' TPACK. As is shown above, different findings were obtained through factor analysis for different studies in different contexts. One possible reason is that each study mentioned above used different survey tools to collect data about teachers' TPACK. For example, Archambault and Barnett (2009) and I as the researcher of this study developed our own survey tools while Koh et al. (2010) used the adapted version of the survey tool by Schmidt et al. (2009). Thus, one way to overcome this issue and to measure TPACK consistently in different contexts is to develop a reliable survey tool or other data collecting instruments that could be used universally, so a clear picture of teachers' TPACK in different contexts can be obtained.

On the other hand, because CK is subject-specific (Mishra & Koehler, 2006), when it comes to measuring teachers' TPACK teaching a specific subject, CK needs to be defined specifically for that subject. And because of their interconnections with CK, PCK, TCK and TPACK should also be defined in relation to the specific subject. This will result in the possibility that there should be a specific tool to measure teachers' TPACK for each subject. As a consequence, attempts to develop a universal instrument to measure teachers' TPACK might be very difficult. This issue leads to the question on "the value of the TPACK framework itself as a cohesive, overarching model" (Archambault & Barnett, 2010, p. 1660).

Furthermore, findings from exploratory factor analysis on the teachers' TPACK point to the second possibility that, although TPACK might exist in reality (as evidenced in



Koh et al., 2013), TPACK is just “a temporary concept ... adaptive to conditions and contexts” (Hughes & Scharber, 2008, p. 90). This is because for different contexts such as in the US, Singapore or Vietnam (Archambault & Barnett, 2009; Koh et al., 2010; Koh et al., 2013 and this study respectively), different patterns of the teachers’ TPACK were reflected.

From Hofer and Swan’s (2006, p. 196) perspective, TPACK is “a moving target ... vary[ing] with a given teacher in different situations”. This study suggests that perhaps TPACK is a moving target, and a target which vary with different teachers in different situations.

#### ***5.2.3.4 Toward a simplified definition of TPACK***

As the discussion has shown so far, teachers’ TPACK seems to be a complex concept that needs to be redefined carefully, perhaps in a more simplified way. As indicated by the EFL teachers’ in the questionnaire, they perceived that their TPACK entailed only two groups: Technology-Related Knowledge Domain and Non-Technology Related Knowledge Domain. In the interviews, teachers voiced such definitions as *‘I believe that my knowledge of the English language is more important, because as a teacher I must know my job, my tasks, my variety of choices that I have made, and only when I am informed by my knowledge and information then I want to understand how ICT would help me achieve what I want, what obstacles I would face when using ICT in my teaching and how to overcome them’* (Valerie). This definition by the participant in this study is interestingly similar to the more simplified definition proposed by Brandley-Dias and Ertmer (2013, p. 120) that TPACK should be “a unique knowledge base regarding how technology enables or constrains one’s effort to help learners master specific subject matter”, which was the “initial definition of TPACK” (Brandley-Dias & Ertmer, 2013, p. 120) in previous research.

Therefore, this study calls for the re-examination of a more simplified definition of TPACK as proposed by a number of researchers, such as Angeli and Valanides (2005), Niess (2005), Brandley-Dias and Ertmer (2013) (see section 2.2.4, Chapter Two), and for further validation of these definitions of TPACK in reality. Once this is done, further research could assist in showing evidence of TPACK as “a unique body of knowledge” (Angeli & Valanides, 2009, p. 158) - the transformative perspective; or evidence of TPACK as “integrated from other forms of teachers’ knowledge” (Angeli & Valanides, 2009, p. 158) - the integrative perspective (Angeli & Valanides, 2009; Lubke, 2013; Voogt et al., 2012). This in turn will help decide the focus of research on TPACK such as “on the TPACK itself” or “on the contributing knowledge bases” (Angeli & Valanides, 2009, p. 158) and the methodology to obtain the relevant type of TPACK.

In brief, this section has discussed the self-reported data from the questionnaire and interviews with the EFL teachers in relation to the extent of their TPACK, the associations and boundaries among the seven TPACK domains, and the TPACK in reality. The next section discusses integrated findings in relation to research question three.

## **5.3 Relationships between teacher demographics, ICT applications and factors**

### **5.3.1 Age**

About 15 years ago, Prensky (2001) presented his argument about the generation of digital natives versus the generation of digital immigrants, and the resulting immigrant/native divide (see the Introduction Chapter). It could thus be easily assumed from Prensky’s (2001) perspective that as digital natives, young teachers, who grew up with technology and are able to use technology in their everyday lives, are more likely to

use ICT in their teaching more frequently than older teachers, who fall into the category of digital immigrants (Carr, 2013).

This study has found otherwise. As indicated in section 4.3.1 of Chapter Four, the valid mean score of the teachers' age is 31.74, indicating that the majority of the EFL teachers were likely to be born after 1980 and thus they fell into the digital natives group as defined by Prensky (2001). Also in section 4.3.2 of Chapter Four, it was found that the EFL teachers' age had a significant and positive correlation with frequency of use of both 'ICT applications for teaching' and 'ICT applications for communicating'. This means that for a number of EFL teachers, the older they were, the more frequently they tended to use ICT applications for teaching and for communicating in their classroom practice. This study has also found that age appears to have correlations with one TPACK domain, the 'Non-Technology Related Knowledge', but not with the other TPACK domain, the 'Technology-Related Knowledge'.

The findings of this study thus challenge Prensky's (2001) perspective of the dichotomy between digital natives and digital immigrants. This study has shown that in the group of digital natives alone, there are some differences in the use of technology by the older teachers and the younger teachers. In this particular group of digital natives, older teachers seem to use technology applications more frequently in their classroom teaching than younger teachers. Also, it cannot be concluded that, in terms of teachers' knowledge and skills, TPACK, the digital native teachers are likely to have more technology-related knowledge than the digital immigrant ones.

Also, compared to previous research on the relationship between EFL teachers' age and their ICT use, the current study agrees with the studies by Lam (2000), and Li and Walsh (2011), but disagrees with those by Alkahtani (2011) and X. T. Dang (2014).

These inconsistent findings suggest that teachers' age itself is a complicated variable, and

thus further disproves Prensky's (2001) perspective that "age is a defining factor" (Helsper & Eynon, 2009, p. 505) in teacher use of ICT.

Furthermore, compared to previous research on the relationship between teachers' age and their TPACK, the findings from this study are different from previous studies. For example, Lee and Tsai (2010) found that the older the teachers, the less confident they feel about their TPACK-Web. Unlike Lee and Tsai (2010), this study found that the older the teachers, the more they saw themselves as having 'Non-Technology Related Knowledge'. This again suggests that teachers' age is a complex variable when it comes to studying the relationships between this variable and teachers' TPACK. Discussion now turns to another demographic variable of the EFL teachers, teaching experience.

### **5.3.2 Teaching experience**

This study has found that teachers' teaching experience had significant and positive relationships with their use of ICT (for both teaching and communicating purposes). It seemed that the more teaching experience the EFL teachers had, the more frequently they used ICT in their classroom teaching. The findings differ from previous studies, namely Alkahtani (2011), X. T. Dang (2014), Li and Walsh (2011), Mahdi and Al-Dera (2013), Rahimi and Yadollahi (2011). The reasons for these differences are out of scope of this research study, but might become the focus of future research.

Next, findings from this study show that the EFL teachers' teaching experience had positive correlations with their perceptions on the impact of the factor group 'Access & Provision'. This means that the more senior teachers became, the more they were aware of the impact of these factors. This suggests that at Hanoi University, the research site, there might be a need for more support in terms of professional development, resources, and technical assistance to the more senior EFL teachers to facilitate their use of ICT in classroom practice.

Finally, this study has suggested that there were significant and positive correlations between the EFL teachers' teaching experience and their TPACK (both Technology-Related Knowledge Domain and Non-Technology-Related Knowledge Domain). This finding disagrees with the findings by Lee and Tsai (2010), which indicated that the more experienced teachers had lower confidence in their "TPACK-Web" (p. 1). The reason for this difference might be that the teachers in this study rated their TPACK in relation to a list of ICT applications, while those in Lee and Tsai's (2010) study assessed their TPACK in relation to one specific ICT application, websites, which were included more recently in their classroom instruction.

Thus, teaching experience in this study seems to be an important demographic variable that has relationships with different aspects of teachers' use of ICT, including their use of ICT applications, their perceptions on the impact of factors influencing their ICT implementation, and their TPACK.

### **5.3.3 Gender**

Another demographic variable that was investigated in this study is the EFL teachers' gender. This study found that in the self-reported data from the questionnaire, the EFL teachers' gender seemed to have some relationships with their ICT use. More specifically, male teachers tended to use 'ICT applications for communicating' more frequently than female teachers. The finding agrees with a number previous research studies such as X. T. Dang (2014), Mahdi and Al-Dera (2013), Topkaya (2010) but disagrees with other research studies such as Rahimi and Yadollahi's (2011). In relation to previous research studies with similar findings, those studies only emphasized relationships between teachers' gender and their general use of ICT/computers. This study was among the first to investigate relationships between teachers' gender and use of ICT for specific purposes, i.e. for communicating. Also, while disagreeing with some previous research

studies, this study calls for more research on the relationships between gender and teachers' ICT use, which are more continuous and longitudinal across contexts to obtain a more accurate picture of these relationships.

In addition, this study found that gender had a positive correlation with teachers' perceptions on the impact of 'Institutional Culture'. It seems that male teachers tended to be more concerned about the impact of 'Institutional Culture' than female teachers when using ICT in teaching. The reasons for this, however, are not a feature of this study.

In terms of the relationships with teachers' TPACK, this study has found that gender had statistically significant and positive correlations with both TPACK domains: Technology-Related Knowledge Domain and Non-Technology Related Knowledge Domain. It seems that male teachers felt that they had more knowledge of these two TPACK domains than did female teachers. The findings thus indicated that the female EFL teachers at Hanoi University seem to need more support to develop both domains of their TPACK, which could be delivered through professional development courses by the university.

Also, compared to previous research on teachers' gender and TPACK, the findings of this study from a Vietnamese context are different. For example, Koh et al. (2010) found that in Singapore, male teachers had more TK than female teachers. Jamieson-Proctor, Finger and Albion (2010) in contrast found "no difference" (p. 10) in the teachers' self-ratings about TPACK between male and female teachers in Australia. Jordan (2011) concluded that the Australian female teachers seemed to be more confident in their PK, while male teachers were more confident in their TPK. Thus, this study supports the view that, in current research, "the role of gender in relation to perceived TPACK knowledge is unclear" (Jordan, 2011, p. 23). One possible explanation is that the difference in the research context has resulted in different results in this regard. Thus, perhaps future

research could look more closely at teachers' gender and their TPACK in more varied contexts, so a better understanding of the relationship between teachers' gender and their TPACK could be obtained.

#### **5.3.4 Main area of specialization and highest qualification**

The last two demographic variables that were investigated in this study were teachers' main area of specialization and highest qualification. It was found that teachers' main area of specialization might be an important factor because it had statistically significant and positive correlations with teacher use of ICT (for teaching and communicating purposes), with their perceptions of the impact of all three groups of factors 'Access & Provision', 'Institutional Culture' and 'Teacher Beliefs & Knowledge', and with teachers' TPACK.

It was also found that the teachers' highest qualification had statistically significant and positive correlations with their use of ICT applications for teaching. It seems that the higher qualification the EFL teachers had, the more frequently they employed ICT for their classroom teaching. The finding somewhat agrees with Sadeghi et al.'s research (2014), which suggests that EFL teachers with PhD qualifications show a more positive attitude towards the use of computers for teaching.

Thus, the findings on the relationships between teachers' demographic features, such as age, teaching experience, gender, main area of specialization, highest qualification and teachers' use of ICT, their perceptions on the impact of factors, and their TPACK show that these demographic variables are complex variables. The findings, therefore, illustrate the complexity around teacher use of ICT (Mishra & Koehler, 2006). The findings also suggest that future research could continue to look at this complexity, rather than looking for a simplistic answer to this complex problem. This complexity is discussed further in the next part of this chapter.

## **5.4 Complexity in ICT use**

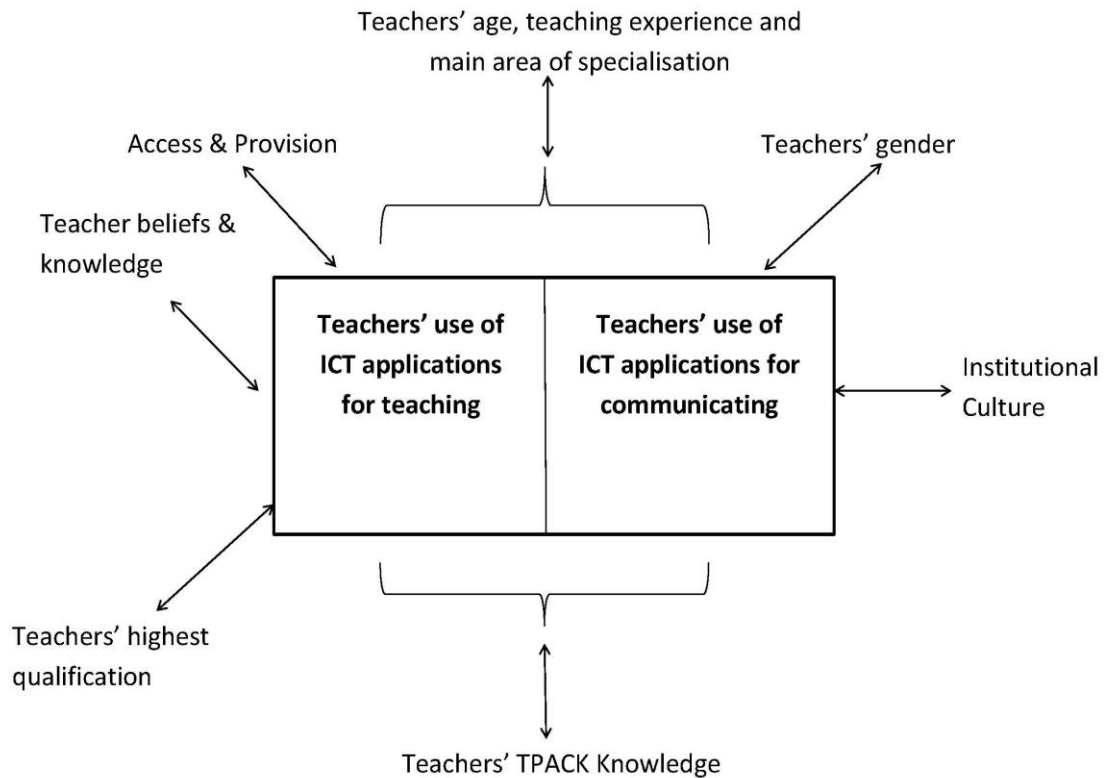
Findings obtained from this study highlight the complexity in ICT use by individual teachers in a higher education context. The complexity manifests itself in the complicated relationships among teachers' use of ICT and the factors influencing this use, as well as a possible simultaneous occurrence of two types of ICT implementation by the teachers. I discuss this complexity below.

### **5.4.1. Relationships among factors and ICT use**

This study has supported the view that teachers' use of ICT is a complex process (Mishra & Koehler, 2006). This complexity is reflected in the fact that teachers used ICT for different purposes, such as for teaching and for communicating, as shown by the exploratory factor analysis on ICT applications from the questionnaire findings. The complexity is also reflected in the complicated relationships between teachers' use of ICT for different purposes and the factors influencing this use, through Spearman Rhos calculated for questionnaire findings. Figure 11 describes this complexity.



Figure 11 Relationships among teacher use of ICT and factors influencing this use



As indicated in Figure 11, teachers' use of ICT is a complex process, and the factors influencing this use have complicated relationships with teachers' ICT use. Figure 11 shows that factors and different groups of factors have different relationships with teachers' use of ICT for different purposes. For example, the factor groups 'Access & Provision' and 'Teacher Beliefs & Knowledge' had positive correlations with teachers' use of ICT for teaching. Likewise, a teacher demographic variable, highest qualification had a positive correlation with their use of 'ICT for teaching'. Furthermore, the group 'Institutional Culture' had a positive correlation with teacher use of 'ICT for communicating'. Another teacher demographic variable, gender, also had a positive correlation with this use of ICT. Finally, some other teacher demographic variables such as age, teaching experience and main area of specialization seemed to have positive

correlations with both their use of ‘ICT for teaching’ and ‘ICT for communicating’. Teachers’ TPACK also had positive correlations with teachers’ use of ICT for both teaching and communicating purposes.

This study argues that the ‘techno-centric’ view of implementing technological change that often focuses only on putting the technology in place without considering other factors that might influence this implementation process, somehow ignores or downplays the complexity of the process of ICT implementation in classroom teaching by teachers (Jordan & Dinh, 2012; Mishra & Koehler, 2006). Instead, the findings support the ecological perspectives (Zhao & Frank, 2003) in that when the keystone species (the EFL teachers) come into contact with the the invading species (the technology) when using ICT in classroom teaching they also come into contact with other keystone species (such as, the factors coming from different sources that were categorised into ‘Access & Provision’, ‘Institutional Culture’ and ‘Teacher Beliefs & Knowledge’). As such, it could be that the teachers need time and support to “adapt and co-evolve” (Zhao & Frank, 2003, p. 817) with the invading species (the technology), and other keystone species in the ecological system (the school/university system). This study thus advocates the ‘evolutionary’ rather than the ‘revolutionary’ (Zhao & Frank, 2003, p. 833) approach to implementing technological change at educational institutions, including Hanoi University, the research context.

This study also agrees with Rogers’ (2003) Diffusion of Innovations Theory in that some attributes of *the adopter’s characteristics* (in this study, the EFL teacher’s demographic features) such as age, (teaching) experience and level of education (qualification) seem to have relationships with his/her adoption of the innovation (in this case, ICT in classroom teaching). This study also found that other than those adopter’s characteristics suggested by Rogers (2003), some adopter characteristics such as gender

and main area of specialization might have relationships with his/her adoption of an innovation.

#### **5.4.2 Two types of ICT implementation by EFL teachers**

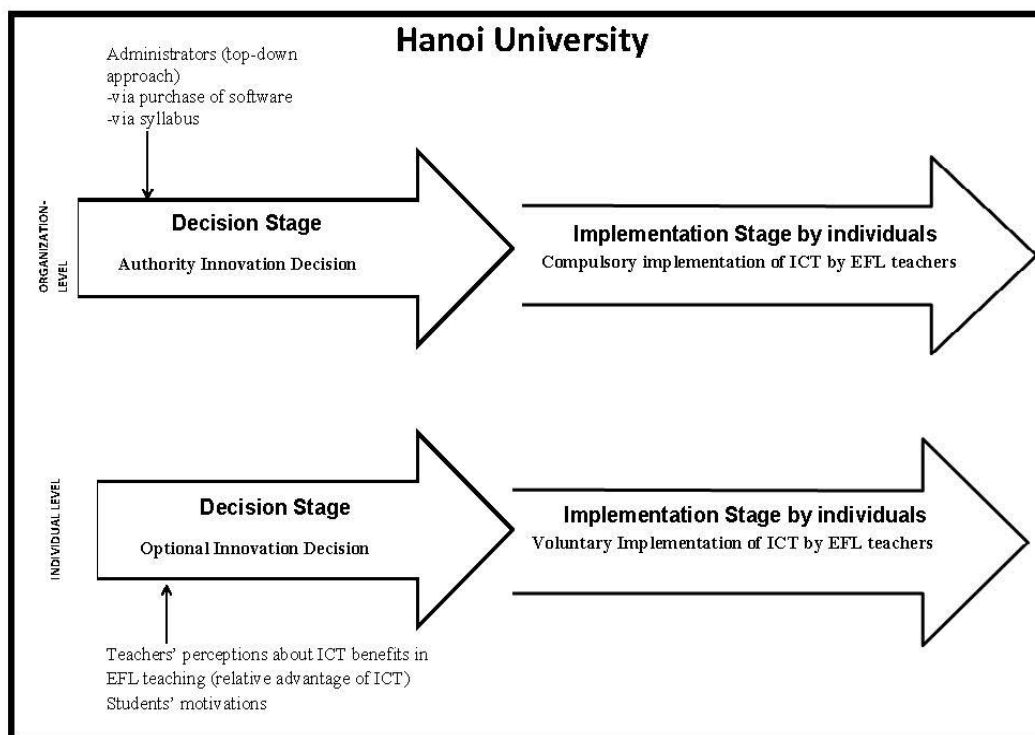
This study has also provided evidence to show that teacher decision-making in relation to an innovation (in this study, ICT) is a complex process. This is reflected in the evidence from the interviews that there might be two types of implementation stages of ICT by the EFL teachers, which happened simultaneously at Hanoi University. These were *compulsory implementation* and *voluntary implementation*.

In more detail, the EFL teachers were in their *compulsory implementation stage* of ICT applications in classroom practice because this was required by the university through the purchase of the courseware *English Discovery Online* (EDO) and through inclusion of this courseware into the syllabus. The best illustration of this point is such comments as that by Valerie that “*if you consider the inclusion of an hour of EDO weekly into the syllabus as policies to integrate ICT into classroom teaching, then it is the policy*”. Thus, it was a must for a number of EFL teachers to implement ICT in their classes. For this compulsory implementation of ICT by the EFL teachers, because the Decision Stage was started by university’s administrators, the type of decision was “*authority innovation decision*” (Rogers, 2003, p. 38).

However, the EFL teachers who were not required to use ICT by the syllabus still strove to *voluntarily implement* ICT in their classes because they perceived that ICT applications were beneficial to their EFL teaching (“*no one forces me to use ICT - I have been using it because I see its positive side*”(Judy) or because they perceived ICT as a motivator for students’ learning (“*I sometimes take my students to the projector room in the Speaking lesson although I am not officially required to do so ... because I want to motivate my students*”(Mary). The decision to use ICT by the EFL teachers was “*optional*

innovation decision” (Rogers, 2003, p. 38). Figure 12 depicts these two simultaneous ICT implementation stages by EFL teachers at Hanoi University.

*Figure 12: Two simultaneous implementation stages of ICT by EFL teachers at Hanoi University*



The findings seem to expand the Diffusion of Innovations Theory by Rogers (2003) in a number of important aspects. To begin with, the Diffusion of Innovations Theory (Rogers, 2003) is only concerned with the Innovation Decision process at the individual level. The findings of this study show otherwise. As can be seen from Figure 12 above, some stages in the Innovation Decision process can happen at both organisational level and individual level at the same time. As can be clearly seen in this study, at the university level, the Decision Stage happened because the administrators purchased the software package and included it in the teaching syllabus. At the teacher level, the Decision Stage happened because the EFL teachers perceived ICT as beneficial to their own classroom practice, and they saw students as motivation for their ICT implementation.

Next, the findings show that two types of Implementation Stages by individuals could be happening at the same time depending on the *Decision Stage* at different levels. This study has suggested that the Implementation Stage by individuals could be influenced by the Decision Stage at organisation and individual level. To be more specific, *Compulsory Implementation Stage* of ICT implementation into EFL teaching by the EFL teachers at Hanoi University was influenced by the *Authority Innovation Decision Stage* begun by the university administrators at university level. Concurrently, at teacher level (individual level), *Voluntary Implementation Stage* of ICT implementation was also influenced by the *Optional Innovation Decision* by the EFL teachers themselves.

Also, the findings confirm at least two stages of the five stages in the Innovation-Decision process, the Decision Stage and the Implementation Stage, are complex stages. The complexity is reflected in the fact that at least two parties in an organisation (in this study, the administrators and the EFL teachers) had direct involvement in the Decision Stage, and that two simultaneous Implementation Stages by individuals (in this study, the EFL teachers) could happen, thus making the Innovation-Decision Process an even more complex process. As a result, a simplistic linear view of teacher decision-making in relation to an innovation should not be encouraged.

## **5.5 Overall discussion**

This study sets out to investigate the use of ICT applications in classroom teaching and the impact of the factors influencing the EFL teachers' use of ICT, including their TPACK from the perspectives of the teachers.

This study suggests that the EFL teachers seemed to be aware of the benefits of ICT to their classroom instruction of the English language. They also indicated that their beliefs about ICT benefits had the biggest impact on their ICT use. Also, the EFL teachers seemed to acknowledge that their students' better technical knowledge and skills were a

motivation for them to develop professionally, and they reported using students with good technical skills as aids in their use of ICT. The EFL teachers were also aware that they had more ‘Non-Technology Related Knowledge’ than ‘Technology-Related Knowledge’.

Yet, there seems to be a gap between what the teachers perceived and what they actually did in using ICT. Specifically, although the EFL teachers had positive awareness toward ICT, they used ICT in a more teacher-centred approach, more as a tool to assist their classroom instruction, rather than as a tool for students’ learning. It is also possible that because the EFL teachers had more ‘Non-Technology Related Knowledge’, they tended to stick to the teaching tradition of Vietnam, which is more teacher-centred, when implementing ICT in their teaching. This is consistent with previous research (Kim, 2008; Li & Ni, 2011).

Furthermore, the study takes the ecological perspective (Zhao & Frank, 2003) that ICT implementation is a continuous process, during which the technology, the teachers and other parties in an institution come into contact and interact with one another. During this process, all the parties need to adapt to co-evolve together. This study thus advocates for the ‘evolutionary approach’ (Zhao & Frank, 2003, p. 833) to implementing technology change, which holds that there should be support provided to the teachers who are the main users of technology, and that the support should be on-going because ICT implementation is a continuous process.

This study has also confirmed that besides being a continuous process, ICT implementation is a “complex and messy process” (Zhao et al., 2002, p. 482). Specifically drawing on the EFL teachers’ perceptions, the study revealed that these teachers’ ICT use was influenced by different factors, though the impact varied. The study also showed that the influencing factors came from different sources (from the teachers themselves, the teachers’ peers, the students, the technicians, the administrators

and the technology itself), suggesting that the EFL teachers in this study perceived “the social dynamics” (Zhao et al., 2002, p. 494) at the university. Also, the influencing factors were interwoven and interacted with one another in a particular way. As shown through exploratory factor analysis, the factors could be classified into three groups: ‘Access and Provision’, ‘Institutional Culture’ and ‘Teacher Beliefs & Knowledge’. Adding to this complexity and messiness is the teachers’ demographic features. The study has found that even the EFL teachers’ demographic variables such as their age, gender, teaching experience, main area of specialization and highest qualification were complex variables when it comes to the relationships of these variables and teacher use of ICT.

In addition, the study has shown that at the university, ICT implementation was decided by both the administrator and the teacher. It seems that the university administrators adopted the ‘techno-centric’ view in the process. This view is reflected in 1) the university purchase of software and courseware, namely *English Discovery Online (EDO)* and implementation of this courseware into EFL classroom teaching through the teaching timetable, 2) investment in technological infrastructure and 3) provision of ICT-related professional development to EFL teachers on technical aspects, rather than pedagogical aspects. Also, a lack of organisational support and direction in the ICT implementation process at the university was evident throughout this study. In contrast, some teachers decided to use ICT because they thought that ICT was beneficial to their students, and they thought that their students needed ICT to learn. It seems that, to these teachers, students should come first.

In summary, the picture drawn by this study is that in the EFL teachers’ perspectives, ICT use in their classroom practice at Hanoi University is indeed very complex. The study disproves the perspective that suggests finding a “one shot” (Chamber & Bax, 2006, p. 477) linear solution to this complexity. Thus, there should be multiple solutions

targeting the different parties involved in the implementation of ICT at the university.

This is the focus of the last chapter, Chapter Six, which discusses recommendations and implications of the research study.



## Chapter Six: Conclusions and Implications

Prior to presenting an introduction of this chapter, it is worthwhile to remind the reader that this study took place in a specific context. Vietnam as a developing country is trying to accelerate the use of ICT in higher education as a means of fostering innovation and modernization. Hanoi University, the setting of this study has invested in putting ICT implementation into place. Investment in professional learning of teachers to support the development of knowledge and skills to use ICT effectively in practice has not been such a priority.

This study set out to investigate EFL teachers' use of ICT in classroom practice at Hanoi University, and factors that influence this process from the perspective of the EFL teachers themselves. This involved the use of a quantitative questionnaire administered to 81 EFL teachers from the English Department and Foundation Studies Department of the university, and qualitative semi-structured interviews with seven teachers. Data were analysed separately, and then mixed in the discussion stage for the purpose of "between-method triangulation" (Denzin, 1989, p. 244), so that a holistic picture of the EFL teachers' ICT use and the impact of factors on their ICT use could be obtained.

The study attempted to answer three main research questions. In relation to the EFL teachers' perspectives:

1. Which ICT applications do they use in their classroom practice?
2. What is the impact of particular factors on their use of ICT in their classroom practice, including teachers' TPACK?
3. What is the relationship between their age, gender, teaching experience (years and specialization) and qualifications and
  - a. ICT applications used in classroom practice

## b. factors influencing ICT use, including teachers' TPACK

In this chapter, I first present a summary of the key findings from the study. I then provide an account of the contribution that the study has made to existing knowledge, to new knowledge and to the specific context of the research. After that, I discuss implications for policies, professional learning and the EFL teachers, in line with the main findings. A discussion on the limitations of the study and implications for future research follows the implications. Concluding remarks then end this chapter.

### **6.1 Summary of key findings**

This section summarises the key findings of the study in answer to the research questions.

#### **6.1.1 ICT applications used**

This study has found that most of the EFL teachers made frequent use of certain ICT applications such as Electronic dictionaries, Power Point, Word Processor and Digitized audio-video in their classroom practice. In contrast, they did not often use other ICT applications such as Voice chat and Audio/Video Conferencing. The use of ICT applications was for teaching and for communicating purposes (as explored through factor analysis for questionnaire data).

The teachers also reported that they used multiple ICT applications as tools to assist their teaching, and for different instructional purposes such as delivering content, information display, or communicating with students. One exception was the use of ICT for motivating students to learn. The teachers also indicated that they used ICT more than the students. Finally, they suggested they used ICT because they were required to by the university, because they thought that ICT was beneficial to their classroom teaching, and because they thought ICT was necessary for their students.

### **6.1.2 Impact of influencing factors on teachers' use of ICT in classroom teaching**

In asking this question, I responded to a large body of research that has shown that many factors impact on teachers' use of ICT. Drawing on research that indicated that this would be likely to involve teachers, students, technicians, colleagues, administrators and technology/ICT, in this study, I was interested in which factors influenced their use the most, as well as the detailed impact of the factors in relation to teachers, students, technicians, colleagues, administrators and technology/ICT.

It seems apparent from this study that the teacher is the most important influencing factor, with questionnaire data and interview data indicating this. In particular, 'Teacher beliefs in the benefits of ICT toward EFL teaching' and 'Teacher knowledge and skills of using ICT to teaching English' seemed to have the highest ratings in terms of the impact.

The influence of other factors, however, is less clear. For example, in relation to the impact of the student, while 'Students' motivation to use ICT' seemed important, as this was rated by the teachers as having the second highest impact, 'Students' prior experience' was rated as having the second lowest impact. Interview findings gave more detail about the impact of this factor. Also, it appears that 'Students' technical knowledge and skills' had an impact on the EFL teachers' use of ICT, though the impact was not as high as other factors. Interview data suggests that when students had a lack of knowledge and skills, they tended to rely on their teachers for assistance, yet when they had high levels of knowledge and skill they were used by some teachers as an aid in their classes. Further to this, some teachers regarded students with better technical knowledge and skills than themselves as a motivation for them to self-learn and catch up with their students.

A lack of clarity is also evident in relation to technical support. 'On-site technical support' was rated as having the fourth highest impact by the teachers in the

questionnaire. The majority of teachers interviewed claimed that they used this type of support in their classroom teaching when technical problems happened. In contrast, 'After-hours technical support' was reported to have the second lowest impact on teachers' use of ICT. Similarly, six out of seven teachers interviewed indicated that they did not employ this type of technical support. Instead, they turned to their friends and colleagues if required.

Furthermore, there seemed to be diverging opinions on the impact of colleague-related factors. In the questionnaire, factors such as 'Colleagues' commitments to use ICT' and 'Colleagues' help in using ICT' were rated as having the third and fifth lowest impact. Yet interviews show that colleagues' support in sharing resources and exchanging ideas, and colleagues' use of ICT tended to motivate the teachers' use of ICT. This also suggested that there was a culture of sharing among the EFL teachers in the two departments of the university.

This study has also found that although the teachers were concerned about 'Knowledge of where to look for support', they were not concerned about 'Financial support from the university'. Indeed, interview findings indicated that there was a lack of administrative support, clear guidance and policies as well as professional development at the university. They thought that professional development courses at the university only focused on technical aspects, rather than ICT-related pedagogies, which was what they thought they needed. As a result, the EFL teachers tended to use their friends and colleagues as the main sources for self-learning about ICT use for classroom teaching.

In relation to technology-related factors, although 'ICT relevance to curriculum' was rated as having the second highest impact on teachers' use of ICT, no interview findings were available for this factor. Yet interview findings suggested that other factors, such as

a lack of facilities, technical breakdowns and issues with resource provision, tended to hinder their use of ICT in classroom teaching.

This study has also shown the complexity of teachers' use of ICT in classroom practice. This was reflected in findings around the complex relationships between teacher use of ICT and factors influencing their use, including their TPACK and their demographic features, as well as findings around two implementation stages of ICT happening simultaneously. The complexity also manifested itself through teachers' perceptions of the impact of factors that came from different sources such as the teachers, the students, their colleagues, the technicians, the administrators and the technology. The study has also suggested that there were dynamics among these factors as they tended to associate with one another in three groups. I then labelled these groups as 'Access & Provision', 'Institutional Culture' and 'Teacher Beliefs & Knowledge'.

Finally in terms of the teachers' TPACK, the study found that more teachers rated their domain knowledge higher in relation to CK, PK, PCK rather than those domains concerned with Technology Knowledge, such as TK, TCK, TPK, and TPACK. This study also revealed two TPACK domains: 'Non-Technology Related Knowledge Domain' (CK, PK & PCK) and 'Technology-Related Knowledge Domain (TCK, TPK & TPACK). TK was found to have no associations with the other remaining TPACK constructs. Finally, there was a positive correlation between the EFL teachers' TPACK (both 'Non-Technology Related Knowledge' and 'Technology Related Knowledge') and their use of ICT applications in classroom teaching (for teaching and for communicating), which suggested that the more TPACK teachers had, the more likely it was that they used ICT applications in their classroom teaching.

### **6.1.3.a Relationships between teachers' demographics and ICT use**

This study has found that the EFL teachers' demographic features such as number of years of teaching, age, and main area of specialization had positive correlations with their use of 'ICT applications for teaching' and 'ICT applications for communicating', while highest qualification had a positive correlation with their use of 'ICT applications for teaching'. Gender had a positive correlation with teachers' use of 'ICT applications for communicating'.

### **6.1.3.b Relationships between teachers' demographics and factors**

This study has suggested that the EFL teachers' teaching experience had a positive correlation with their perceptions of the impact of the 'Access & Provision' factor group. The main area of specialization had a positive correlation with teachers' perceptions on the impact of all three groups of factors 'Access & Provision', 'Institutional Culture', and 'Teacher Beliefs & Knowledge'.

Finally, gender, teaching experience and main area of specialization had positive correlations with their TPACK (both 'Non-Technology Related and 'Technology-Related Knowledge'), whereas age was correlated with teachers' TPACK 'Non-Technology Related Knowledge'.

The above key findings of the study are used to highlight the contributions this study has made to existing knowledge, to new knowledge and to the context of the research, which are presented in part two below. These key findings are also used to propose what implications this study has in relation to government policies, guidelines of the university, professional learning and the EFL teachers at the university, which are presented in part three of this chapter.

## **6.2 Contribution of the study**

### **6.2.1 Contribution to existing knowledge**

The first contribution this study makes is to the body of research on educational technology around the use of ICT applications by EFL teachers in their classroom teaching. To be more specific, this study has shown that the EFL teachers often used a mix of common applications such as Power Point presentation software, and Word-processor, and language-specific applications such as Electronic dictionaries and Digitized Audio/Video in their classroom teaching. Also, their use of ICT is as a tool to support their classroom teaching.

This study has also confirmed the complexity of implementing ICT in an educational context. Specifically, it suggests that the complexity manifests itself in the fact that different parties at an institution might be influencing teachers' ICT use. It also suggests that the factors affecting the teachers' ICT use might not be clear-cut, but rather are likely to be interwoven.

Furthermore, this study has added to the literature around teachers' TPACK and ICT use. It suggests that teachers' knowledge to use ICT, conceptualised by the TPACK framework (Mishra & Koehler, 2006), might have relationships with their use of ICT applications in their classroom teaching. This study has also supported the view that more than one type of knowledge might be needed by teachers in order to use ICT in their classroom teaching. It has also suggested that teacher TPACK might be a complex concept and that more research is needed to clearly define each TPACK construct and the boundaries among them.

This study also suggests that the Diffusion of Innovations Theory (Rogers, 2003) and the ecological perspective (Zhao & Frank, 2003) are useful in explaining how factors impacting on teacher use of ICT operate and relate. This study suggests that some

characteristics of the adopter (teacher) such as *age*, *experience* and *level of education* have a relationship with the adoption of an innovation. Furthermore, one attribute of an innovation, *relative advantage* (in this study, teachers' beliefs in ICT benefits to EFL teaching) has the highest impact on the adoption of an innovation. This study also suggests that, as argued by the ecological perspective (Zhao & Frank, 2003), teachers' ICT use is a dynamic process where teachers come into contact with different parties in an institutional context.

Finally, this study was conducted from a pragmatist perspective, and as such, it used a combination of quantitative and qualitative approach. This mixed methods research study has helped provide answers to the intended research questions, and the main findings have provided a rich account of EFL teachers' use of ICT in classroom practice, thus the main goal of using a mixed methods research has been achieved. This in turn strengthens the usefulness of pragmatism in providing a lens to look at teachers' use of ICT in their teaching practice.

### **6.2.2 Contribution to new knowledge**

This study has also contributed to new knowledge in a number of important aspects. First, while there has been considerable research around factors that impact on teacher decision-making, much of this has been conducted in Western countries. This study has focused on a university context in Vietnam, a developing country, which is under-researched.

This study also adds to our understanding of the importance of teacher knowledge in relation to ICT. It provides a survey instrument tailored to the seven TPACK constructs of the EFL teachers. Initial face validity of the tool was checked through a pilot study with 22 teachers, and internal consistency was obtained through Cronbach's alpha for each TPACK component after exploratory factor analysis. The study also suggests, as have other researchers, that there are various ways in which the domains of Technology



Knowledge, Content Knowledge and Pedagogy Knowledge can be represented. Instead of the equal weight being given to the seven TPACK constructs as in the representation of Mishra and Koehler (2006), this study suggests that TPACK has two main groups of constructs: Technology-Related Knowledge Domain (TCK, TPK, TPACK) and Non-Technology Related Knowledge Domain (CK, PK & PCK), and that TK has no associations with the remaining six constructs.

This study also suggests that while the Diffusion of Innovations Theory (Rogers, 2003) can be useful in providing a lens to look at the Innovation-Decision Process by individuals in relation to an innovation, some refinement to the Theory is needed to reflect the complexity around individuals' decision-making. As could be seen in this study, a simultaneous occurrence of the Authority Innovation Decision and Optional Innovation Decision resulting in the Compulsory Implementation and Voluntary Implementation of an innovation could happen. As such, this suggests that there should not be a simplistic way of looking at complex realities around individuals' decision-making in relation to an innovation. The study also suggests that in relation to adopters' characteristics, *gender* and *main area of specialization* might have relationships with their adoption of an innovation, in addition to those characteristics outlined by Rogers (2003) such as age, experience and level of education as mentioned in the above section.

### **6.2.3 Contribution to the context of the research**

This study makes a significant contribution to the context of the research, including the broader context, the country of Vietnam, and the site where the study was set, Hanoi University. In relation to Vietnam, this is an under-researched context and this study has been one of the first attempts to provide evidence on the use of ICT in classroom by the in-service EFL teachers in higher education, and the impact of the influencing factors on their ICT use, including their TPACK. This study has also suggested that in relation to the

study context, Hanoi University, EFL teacher use of ICT is a complex process in which the teachers seem to be the most important influencing factor. As a result, appropriate policies might be formulated by government agencies and the university based on the study's findings, which are especially important given the importance of the English language in the national education system, combined with the increasing use of ICT in EFL as a means for the country to integrate into the global economy, as discussed in Chapter One. These policy implications are discussed in the first two sections of part three of the chapter below.

## **6.3 Implications of the study**

### **6.3.1 Policy initiatives**

I argued in the introductory chapter that Vietnam's national policies tended to set ambitious goals for integrating ICT into education but lacked clarity around the means to achieve these goals. This study has suggested that it is teachers themselves who are the most important factor when it comes to teacher use of ICT. Based on this finding, it, therefore, seems important for policy-makers to focus on teachers, and to consider the type of support that could be provided to achieve policy goals. For example, a greater focus on professional learning and professional learning strategies could be valuable in supporting teachers to acquire the knowledge and skills to use ICT in their classroom teaching. The study has also suggested that the more TPACK teachers had, the more likely it was that they would be using ICT. Therefore, professional learning that has a particular focus on teachers' knowledge and how to develop teachers' TPACK, and not only on technical aspects is recommended. Moreover, the study has highlighted the issues with unreliable technology and irrelevant resource provision. Thus, more attention could be paid to support provided to teachers in terms of reliable technology and proper resources.

This study has also shown that ICT implementation is a complex process, influenced by a number of factors that are intertwined. Policy initiatives could consider this complexity, and offer an “all-embracing approach” (T. X. Dang, 2014, p. 141) in implementing ICT that targets the different parties involved in this process.

### **6.3.2 ICT-related guidelines at Hanoi University**

This study suggests that Hanoi University could make more use of having clear guidelines for teachers around implementing national policies. Perhaps, at this stage, quarterly meetings could be organised between the administrators such as the Vice-chancellor and Head of Studies with some representative EFL teachers, or an online forum on the internal network of the university might be established to facilitate communication between the teachers and the Deans of each department. Through these meetings and forum, updated guidelines on ICT use could be communicated between the administrators and the EFL teachers, so proper adjustments to the guidelines could be made in a timely manner. Finally, as suggested by Tondeur et al. (2008), involving the teachers in the draft of an ICT plan might be a good way to go, as the teachers could have a chance to voice their needs, and thus the ICT plan could align with both the administrators’ and the teachers’ perspectives.

### **6.3.3 Professional learning at Hanoi University**

This study has suggested that the EFL teachers had positive attitudes to using ICT in EFL teaching, that most used ICT to support their classroom teaching, but felt that there was a lack of focus on ICT-related teaching pedagogies in professional development courses provided by the university, as well as a lack of TPACK Technology-Related knowledge domain among the teachers. Professional learning at the university that has particular foci could be of benefit, namely: 1) transferring teachers’ beliefs in the benefits of ICT and their receptiveness into practice, 2) training teachers in ICT-related

pedagogies, and 3) developing ICT-related knowledge such as knowledge on ICT applications for English language, English linguistics and English culture (TCK), or learning theories with ICT, or using ICT to manage classroom (TPK), and evaluating software (TPACK).

In order to achieve these aims, professional development courses provided by the university should focus on providing teachers with opportunities to value ICT applications for their classroom teaching. For example, they could explore a wide range of ICT applications for teaching English in real classroom settings, reflect on which ICT application is more beneficial and more applicable in their circumstances, draft lesson plans on how to include specific ICT applications into their teaching, which teaching pedagogies they could use with these applications, and how their students could most benefit from the use of these ICT applications. They could then implement real teaching with the proposed application(s) and decide for themselves what might be suitable or what might be improved. Also, the teachers could observe the ICT-based lessons conducted by some experienced teachers to learn directly from them. Through this process, they could develop their knowledge of ICT applications, their own skills, and pedagogies to use these applications with students, including TCK, TPK and TPACK.

This study also indicated that older, more experienced male teachers reported that they tended to use ICT more frequently and that they had more TPACK. As a result, it might be appropriate to draw on this knowledge by suggesting that these teachers act as official mentors for other 'novice teachers' in terms of ICT use. Also, small support groups led by these teachers could be formed to assist other teachers in their ICT usage. These support groups could organise small workshops in which the more experienced teachers could demonstrate how to use ICT in EFL teaching, or to facilitate idea exchange among the teachers in their use of ICT. These workshops could later be uploaded online as a

reference source for the teachers who wish to use ICT in their instruction, so that they could access the resource at the time of need.

Finally, this study has suggested that students tended to rely on the teachers for technical support. It is thus recommended that professional training now should focus on equipping the teachers with knowledge on how to assist students to complete common tasks using technologies. Obviously, during the process, the teachers cannot be expected to act as the technicians in solving all technical problems that their students encounter. Rather, training on how to assist students with common problems should be considered. Training could also be offered to students in how to use ICT to study English. Possibly in the orientation week, students could complete a survey to help determine their confidence in the knowledge and skills necessary to learn with ICT. This type of knowledge and skills can be referred to as some sort of students' TPACK. The results could be used to design short courses that train learners with the necessary knowledge and skills to learn English with ICT. Thus, it is hoped that the students could reduce their dependence on the teachers for technical support and guidance during class time.

#### **6.3.4 EFL teachers**

As stated in the Introduction chapter, this study aimed to benefit EFL teachers. Based on the findings of this study, the teachers could continue to reflect on and further develop their practice, especially in relation to their ICT use in classroom practice. In line with the main findings discussed above, a number of implications for teachers are proposed below.

To begin with, this study suggested that EFL teachers were receptive to using ICT and willing to learn from friends and colleagues. They used both common and language-specific ICT applications, mainly for purposes of content-delivery, information display and communicating with students, so they tended to use ICT as a tool for their teaching.

Perhaps more learner-centred pedagogies focusing on how teachers could use ICT as a tool for student learning could be introduced through professional development programs.

Furthermore, because the Hanoi University is one of the participating universities in the 2020 National Foreign Language Project (see Chapter One), it would seem appropriate to encourage EFL teachers to apply for conference grants provided by the Project. By attending workshops and conferences, teachers could further exchange ideas with their peers nationally and internationally, and thus update their knowledge about ICT use, especially on ICT applications and teaching approaches in a more practical manner.

#### **6.4 Limitations of the study**

No studies are without limitations, and this study is no exception. The most obvious limitation of this study is that caution should be exercised in generalising findings to other research settings because of the convenient sampling strategy, because of the small sample size (81 teachers completed the questionnaire, and seven teachers took part in the interviews), because of the omission of some questionnaire items, and because of the context of the study, that is one university in Hanoi, Vietnam.

In addition, although the study was concerned with the factors influencing the EFL teachers' integration of ICT in classroom practice that came from different sources such as teachers, students, peers, technicians, administrators, and technology/ICT, these factors were studied from the perspectives of the teachers only. Thus, the results might be confined to the subjectiveness of these teachers.

A final limitation is in relation to the use of a questionnaire and interviews as data collecting instruments. These two instruments could only collect self-reported data from the participants. As a result, the results might be subjective.

## **6.5 Implications for future research**

In this part of the chapter, I discuss the implications of this study for future research, based on the main findings, on the contribution of the study to knowledge, as well as on the limitations of the study. These are presented below.

### **6.5.1 Implications for future research based on main findings**

This study has found that the EFL teachers used certain ICT applications, but not others. Future research could delve more closely into the reasons why EFL teachers use particular applications, as well as the reasons why they do not use certain applications.

This study has also suggested that teachers are important factors influencing their use of ICT, and their beliefs are important as well. This is a significant finding and one that is worth further investigation in future research. This research could involve similar contexts and as well different contexts in order to ascertain whether this finding can be more generalised.

Furthermore, the study suggested that teachers rated their knowledge of some domains more highly than others, namely, more knowledge in relation to CK, PK and PCK than TCK, TPK and TPACK. The study has also found that it seems that the more TPACK (both Non Technology Related Domain and Technology Related domain) the teachers had, the more likely it was that they used ICT in their classroom teaching. Future research could repeat this study in another context to see if the same findings emerge. Similarly, more longitudinal studies could also look at whether teachers' TPACK actually transfers into their ICT use in practice.

Finally, this study has produced evidence that teachers' demographic features, such as gender, age, years of experience, main area of specialization and highest qualification, are

complex variables in relation to teacher use of ICT. Future research could continue to look at the complexity of this research area.

### **6.5.2 Implications for future research based on contribution of this study**

As mentioned in Chapter Two, this study has presented a summary representation of the factors influencing teachers' ICT use in classroom practice in a Vietnamese university, as a lens to look at the categorisation of the factors and interactions among the factors. This summary representation of the factors grouped the factors into "biotic factors", which encompasses factors related to teachers, students, peers, technicians, administrators, and "abiotic factors", which includes factors related to technology. Future research could use this representation of the factors in other contexts to investigate its reflection in these contexts. Also, this study has used an integrated conceptual framework (the ecological model and the innovation diffusion model) to inform the development of the summary representation of the factors within a Vietnamese context. Future research might wish to employ this integrated framework to study the factors in different contexts to further verify its application.

Also, this study developed its own instrument to measure the EFL teachers' TPACK. Initial validation of this instrument has been obtained. Future research could look at extending this research to obtain a more comprehensive picture of the EFL teachers' TPACK in Vietnam. The survey tool to measure the EFL teachers' TPACK could also be used in broader contexts where English is taught as a Foreign Language such as Asian or African countries. Thus, appropriate support to develop EFL teachers' TPACK could be provided.



### **6.5.3 Implications for future research based on limitations of this study**

As mentioned in the above section, one of the limitations of this study is the small sample size. Future research on the same topic with bigger sample sizes is warranted to ensure more representative findings.

Next, similar studies on the factors influencing teachers' use of ICT in classroom teaching practice might consider studying these factors from multi-perspectives, such as from the perspectives of students, technicians and administrators. Findings from different perspectives could then be compared and contrasted to achieve a full picture of the factors in a more objective manner.

In addition, this study was conducted at a single point in time and relied heavily on teachers' perceptions on the impact of factors that influenced their use of ICT in classroom teaching along a 4-point scale from No impact to High impact. It is likely that these attitudes could change over time. Future research could be conducted as longitudinal studies or test-retest in order to confirm the impact of the factors over time.

Finally, similar studies could use a combination of different methods for collecting self-reported data on teachers' perceptions such as a questionnaire and an interview like this study. However, because teacher use of ICT is part of their teaching practice, other data collecting methods such as observation could also be employed. This should be done to see whether "teachers' beliefs, intentions and perceptions ... [could] translate into practice" (Hew & Brush, 2007, p. 246).

## **6.6 Concluding remarks**

This study has focused on Hanoi University to develop an understanding of EFL teachers' use of ICT in their classroom practice. I hope this study now provides the voice that has not really been present because most previous research has been conducted in the West.

This is an important research study to do in the current context of Vietnam. As a developing country, Vietnam is looking towards ICT in education as a way of moving forward its efforts to integrate into the global economy in the country's innovation cause. It is, therefore, necessary to conduct research that can support this process. This study, while small, with a questionnaire and some interviews, has aimed to do this. I also hope to inspire others to look at the influence of the context in more detailed studies.

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# Appendix 1: Ethics Clearance from RMIT CHEAN

 **RMIT University**  
*College Human Ethics Advisory Network*  
Phone: 9925-2974  
Email: [lisa.mann@rmit.edu.au](mailto:lisa.mann@rmit.edu.au)

31 August 2012

Ms Huong Dinh  
School of Education  
RMIT University

Dear Huong,

## Ethics Clearance

**Project title:** Factors affecting English as a Foreign Language (EFL) teachers' integration of Information and Communication Technology (ICT) in classroom practice: A case study of Hanoi University, Vietnam

**Applicant/s:** Ms Huong Dinh (Student Researcher) and Dr Kathy Jordan (Supervisor)

**Register Number:** CHEAN B-2000716-06/12

Your amended ethics application has been approved by the Design and Social Context College Human Ethics Advisory Network (CHEAN). Your application has been approved at a Low Risk classification and will be reported to the RMIT Human Research Ethics Committee for noting.

**Your ethics clearance expires on 30 August 2015.**

## Data storage

Please note that all research data should be stored on University Network systems. These systems provide high levels of manageable security and data integrity, can provide secure remote access, are backed on a regular basis and can provide Disaster Recover processes should a large scale incident occur. The use of portable devices such as CDs and memory sticks is valid for archiving, data transport where necessary and some works in progress. The authoritative copy of all current data should reside on appropriate network systems and the Principal Investigator is responsible for the retention and storage of the original data pertaining to the project for a minimum period of five years.

## Annual/Final report

You are reminded that an Annual /Final report is mandatory and should be forwarded to the Ethics Officer in December 2012. This report is available at; <http://www.rmit.edu.au/governance/committees/hrec>

## Amendments

If you need to make any amendments to your project please submit an amendment form to the Ethics Officer. This form is available at; <http://www.rmit.edu.au/governance/committees/hrec>

Should need any further information please contact Lisa Mann on (03) 9925 2974 or [lisa.mann@rmit.edu.au](mailto:lisa.mann@rmit.edu.au)

On behalf of the DSC College Human Ethics Advisory Network I wish you well in your research.

Yours sincerely,

Lisa Mann  
Ethics Officer  
DSC College Human Ethics Advisory Network (CHEAN)

## Design and Social Context College Office

Building 101, Level 10  
171 La Trobe Street  
Melbourne VIC 3000  
Australia

GPO Box 2476V  
Melbourne VIC 3001  
Australia

Tel. +61 3 9925 2226  
Fax +61 3 9663 2891  
• [www.rmit.edu.au](http://www.rmit.edu.au)



## Appendix 2: Explanatory Statement

### Factors affecting EFL teachers' integration of Information and Communication Technology (ICT) in classroom teaching: A case study of Hanoi University

Dear research participant,

You are invited to participate in a research project being conducted by RMIT University. Please read this sheet carefully and be confident that you understand its contents before deciding whether to participate. If you have any questions about the project, please ask one of the investigators.

My name is Huong Thi Bao Dinh and I am conducting a research project with Dr Kathy Jordan, a senior lecturer in the School of Education towards a Doctor of Philosophy in Education at RMIT University. This means that I will be writing a thesis which is the equivalent of a 180 page book. In this research, my overall aim is to identify factors affecting EFL teachers in their adoption of ICT (Information and Communication Technologies) at Hanoi University. I also wish that by conducting this research, we, EFL teachers can give some suggestions that the university administrators can take to further support teachers' use of ICT to make their classroom teaching more beneficial to the students.

I am seeking teachers of English who have used at least one kind of ICT such as video, CD ROMs or software in their teaching to share their experiences and ideas on this topic with me. The study involves anonymous questionnaires and audio-taped interviews in about 40 minutes.

I would like to use the data that I will be collecting from you for my thesis and some possible publications. To protect your privacy, with questionnaires, you will remain anonymous. For interviews, I will code all data and use pseudonyms so that individuals are not identified. Upon your request, I will provide you with the written transcription of questionnaires and the interview before I use it in my research and the data of the study once it is finished. Being in this study is completely voluntary - you are under no obligation to consent to participation. If you do decide to participate you may withdraw at any stage or avoid answering questions which you feel are too personal or intrusive.

I will keep the questionnaire, consent forms, transcripts, data and audio tapes in a confidential place at the School of Education for five years as required. After five years, all records will be destroyed through the secured system at the Faculty.

If you are interested to participate, please contact me at +61 3xxxxxx, or at +84 xxxxxxxx (Vietnam) or email me at [xxxxxxx@student.rmit.edu.au](mailto:xxxxxxx@student.rmit.edu.au).

If you have any question, you can contact the chief investigator-Dr Kathy Jordan, School of Education, College of Social Design and Context. Contact details: Room: 220.3.11. School of Education, Bundoora West, RMIT University, VIC 3083. Email: [kathy.jordan@rmit.edu.au](mailto:kathy.jordan@rmit.edu.au). Phone: (03) 99257813.

<p>If you have any concerns about your participation in this project, which you do not wish to discuss with the researchers, then you can contact the Ethics Officer, Research Integrity, Governance and Systems, RMIT University, GPO Box 2476V VIC 3001. Tel: (03) 9925 2251 or email <a href="mailto:human.ethics@rmit.edu.au">human.ethics@rmit.edu.au</a></p>
--

## Appendix 3: Hanoi University Vice-Chancellor's Permission



**HANOI UNIVERSITY**

Km 9 Nguyen Trai Road, Thanh Xuan, Hanoi, Vietnam  
Telephone: (84-4) 3854 4338 Fax: (84-4) 3854 4550  
Email: [hanu@hanu.edu.vn](mailto:hanu@hanu.edu.vn) Website: [www.hanu.edu.vn](http://www.hanu.edu.vn)

### Permission Letter for “Factors affecting EFL teachers’ integration of Information and Communication Technology (ICT) in classroom practice: A case study of Hanoi University”

28<sup>th</sup> June 2012

Huong Thi Bao Dinh  
Room 220.2.12  
School of Education  
College of Social Design and Context  
RMIT University VIC 3083

Dear Huong Thi Bao Dinh,

Thank you for your request to recruit participants from **Hanoi University** for the above-named research.

I have read and understood the Explanatory Statement regarding the research and hereby give permission for this research to be conducted.

Yours Sincerely,



**A/Prof.DSc Nguyen Dinh Luan**  
President, Hanoi University  
Email: [luannd@hanu.edu.vn](mailto:luannd@hanu.edu.vn)

## Appendix 4: English Department Dean's Permission

English Department, C215-C217  
Hanoi University  
Km 9, Nguyen Trai Road  
Thanh Xuan District, Hanoi  
Telephone: 84.4.38543136  
Fax 84.4.544550  
Email: phucnm@hanu.edu.vn

### Permission Letter for "Factors affecting EFL teachers' integration of Information and Communication Technology (ICT) in classroom practice: A case study of Hanoi University"

28<sup>th</sup> June 2012

Huong Thi Bao Dinh  
Room 220.2.12  
School of Education  
College of Social Design and Context  
RMIT University VIC 3083

Dear Huong Thi Bao Dinh,

Thank you for your request to recruit participants from **the English Department, Hanoi University** for the above-named research.

I have read and understood the Explanatory Statement regarding the research and hereby give permission for this research to be conducted.

Yours Sincerely,



**Phuc Minh Nguyen**

Dean, English Department, Hanoi University

# Appendix 5: Foundation Studies Department Dean's Permission

Foundation Studies Department, C207  
Hanoi University  
Km 9, Nguyen Trai Road  
Thanh Xuan District, Hanoi  
Telephone: 84-4-3553 5728  
Email: ntdung71@yahoo.com

## Permission Letter for "Factors affecting EFL teachers' integration of Information and Communication Technology (ICT) in classroom practice: A case study of Hanoi University"

28<sup>th</sup> June 2012

Huong Thi Bao Dinh  
Room 220.2.12  
School of Education  
College of Social Design and Context  
RMIT University VIC 3083

Dear Huong Thi Bao Dinh,

Thank you for your request to recruit participants from **the Foundation Studies Department, Hanoi University** for the above-named research.

I have read and understood the Explanatory Statement regarding the research and hereby give permission for this research to be conducted.

Yours Sincerely



Dean, **Foundation Studies Department, Hanoi University**

TRƯỜNG KHOA  
*Nguyễn Tiên Dũng*

## Appendix 6: A sample of the questionnaire

*Thank you for taking time to complete this questionnaire. It will take roughly 20 minutes to complete this questionnaire. Please answer each question to the best of your knowledge. Your responses will be kept completely confidential.*

*In this questionnaire, “you” refers to yourself as an English as a Foreign Language (EFL) teacher. Information and Communication Technology (ICT) is understood as any DIGITAL DEVICES that can be used in your instruction such as computers, handheld devices, etc.*

### SECTION 1: PERSONAL INFORMATION

*Please answer the questions in this section by putting a tick in the relevant box or writing a number in the space provided*

- 1. Gender**
1. Female
2. Male
- 2. Total number of years of teaching at Hanoi University:** \_\_\_\_\_
- 3. Age:** \_\_\_\_\_
- 4. Main area of specialization**
1. Language Foundation Skills
2. GET and BEL
3. EAP
4. ESP
5. Language theory
6. Translation skills
7. Interpretation skills
8. English literature
9. English culture
- 5. Highest academic degree**
1. Bachelors
2. Masters
3. PhD

**SECTION 2: ICT APPLICATIONS**

*Please choose the answer that best describes your use of ICT by circling the relevant number*

<b>In your classroom teaching, you have used the following ICT applications</b>	<b>Never</b>	<b>Rarely</b>	<b>Sometimes</b>	<b>Often</b>
1. Tutorials and Drills (e.g., for teaching grammar and/or vocabulary)	1	2	3	4
2. Electronic dictionaries	1	2	3	4
3. Word recognition software (e.g., for teaching pronunciation)	1	2	3	4
4. Web-based activities to teach text structures and/or reading strategies	1	2	3	4
5. Word processor (e.g., for teaching writing)	1	2	3	4
6. Power Point (e.g., for presenting new knowledge)	1	2	3	4
7. Digitized audio and video	1	2	3	4
8. Voice chat	1	2	3	4
9. Audio and/or video conferencing	1	2	3	4
10. Web-based projects	1	2	3	4

**SECTION 3: AFFECTING FACTORS**

*Please indicate the level of impact of each factor by circling the relevant number. Choose one number for each response.*

<b>Factors impacting your ICT integration in classroom teaching</b>	<b>No impact</b>	<b>Low impact</b>	<b>Moderate impact</b>	<b>High impact</b>
11. Your belief that ICT is beneficial to English teaching (e.g. ICT can give students various language inputs or can enable students learning experiences to be more authentic).	1	2	3	4
12. Your knowledge/skills to teach English using ICT.	1	2	3	4
13. Your knowledge of where to look for support (including from the web and colleagues) to use ICT in your teaching.	1	2	3	4
14. Your commitment to using ICT in your practice.	1	2	3	4

15. Your students' motivations to use ICT.	1	2	3	4
16. Your students' technical knowledge/skills to learn English using ICT.	1	2	3	4
17. Your belief that students who have good ICT skills can help you in your class.	1	2	3	4
18. Your students' prior experience in using ICT in their learning (e.g., at high school).	1	2	3	4
19. Your students' commitment to use ICT to learn English.	1	2	3	4
20. Having on-site technical support from university technicians (e.g., setting up equipment, troubleshooting problems, etc.)	1	2	3	4
21. Having after hour technical advice from technicians when needed.	1	2	3	4
22. Having assistance for administrative issues such as reporting technical issues or lab bookings.	1	2	3	4
23. Knowing that your colleagues will help you use ICT in your instruction.	1	2	3	4
24. Knowing that your colleagues are willing to share their technological resources such as learning materials, session bookings.	1	2	3	4
25. Knowing that your colleagues are committed to using ICT in English teaching.	1	2	3	4
26. Knowing that the use of ICT in English teaching is required by the university/department.	1	2	3	4
27. Having access to clear guidelines/policies from the university on using ICT in English teaching.	1	2	3	4
28. Having access to financial support from the university to buy a computer/laptop to use in English teaching.	1	2	3	4
29. Having access to opportunities for ICT-related professional training at the university.	1	2	3	4
30. Provision of teaching resources to teach with ICT by the university/ department	1	2	3	4
THIS ROW IS INTENTIONALLY LEFT BLANK				
31. Your belief that ICT applications are relevant to the curriculum.	1	2	3	4
32. Your belief that ICT applications are relevant to your current teaching practice.	1	2	3	4
33. Having access to a computer lab when you need to use it	1	2	3	4
34. Having access to enough computers for your students in a lesson.	1	2	3	4
35. Having access to reliable technology (such as the Internet) for use with your English teaching	1	2	3	4
36. Having enough time to prepare lessons with ICT components	1	2	3	4
37. Knowing that your department has a syllabus that supports the use of ICT	1	2	3	4
38. Teaching resources to teach with ICT being easily located	1	2	3	4

#### SECTION 4: TEACHERS' TPACK

*Please rate your amount of knowledge in teaching English using ICT by circling the relevant number. Choose one number for each response.*

<b>TK (Technology Knowledge)</b>	<b>Not at all</b>	<b>Little</b>	<b>Moderate</b>	<b>Much</b>
39. You have the knowledge to use common ICT applications such as Word processing.	1	2	3	4
40. You have the knowledge about troubleshooting basic problems (such as installing and removing software programs).	1	2	3	4
41. You have the ability to keep up to date with new technologies.	1	2	3	4
<b>CK (Content Knowledge)</b>				
42. You have the knowledge to teach English language skills such as vocabulary usage and conversation.	1	2	3	4
43. You have the knowledge to teach linguistic knowledge such as knowledge of English sound, word-formation and syntax.	1	2	3	4
44. You have the knowledge to teach cultural understanding of English speaking countries.	1	2	3	4
<b>PK (Pedagogical Knowledge)</b>				
45. You have the knowledge about general learning theories.	1	2	3	4
46. You have the knowledge to cater for different learning styles.	1	2	3	4
47. You have the knowledge to manage your classes.	1	2	3	4
48. You have the knowledge to prepare, plan and deliver teaching.	1	2	3	4
49. You have the knowledge to assess student learning.	1	2	3	4
<b>PCK (Pedagogical Content Knowledge)</b>				
50. You have the knowledge about modifying English language content to suit different types of students.	1	2	3	4
51. You have the knowledge about the ways students interact to negotiate meaning in English.	1	2	3	4
52. You have the knowledge to select effective teaching strategies to guide students' learning in the EFL context (such as pairing or grouping students)	1	2	3	4
<b>TCK (Technological Content Knowledge)</b>				
53. You have the knowledge about technological applications for teaching English language skills.	1	2	3	4
54. You have the knowledge about technological applications for teaching English linguistic knowledge.	1	2	3	4
55. You have the knowledge about technological applications for teaching English culture	1	2	3	4
<b>TPK (Technological Pedagogical Knowledge)</b>				
56. You have the knowledge about learning theories with ICT.	1	2	3	4
57. You have the knowledge about using ICT to cater for different learning styles.	1	2	3	4
58. You have the knowledge about using ICT to manage classes.	1	2	3	4
59. You have the knowledge to prepare, plan and deliver teaching using ICT.	1	2	3	4
60. You have the knowledge to assess student learning with ICT.	1	2	3	4



<b>TPACK (Technological Pedagogical and Content Knowledge)</b>				
61. You have the knowledge of students' learning English with ICT (e.g. student communicative competence and interaction in classes via ICT).	1	2	3	4
62. You have the knowledge to design real-life tasks through which students use ICT to learn English.	1	2	3	4
63. You have the knowledge to evaluate software, tasks and students' performance in a technologically-rich class.	1	2	3	4

**If you are happy to be contacted to discuss your views further in an interview, please provide your email address and/or contact number**

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# Appendix 7: Plain Language Statement for Questionnaire

## PARTICIPANT INFORMATION

**Project Title: Factors affecting English as a Foreign Language (EFL) teachers' integration of Information and Communication Technology (ICT) in classroom practice: A case study of Hanoi University.**

### Investigators:

Dr Kathy Jordan, School of Education, College of Social Design and Context.

Contact details: Room: 220.3.11. School of Education, Bundoora West, RMIT University, VIC 3083.  
Email: [kathy.jordan@rmit.edu.au](mailto:kathy.jordan@rmit.edu.au). Phone: (03) 99257813.

Dr Jennifer Elsden-Clifton, School of Education, College of Social Design and Context

Contact details: Room: 220.4.09. School of Education, Bundoora West, RMIT University, VIC 3083.  
Email: [Jennifer.elsden-clifton@rmit.edu.au](mailto:Jennifer.elsden-clifton@rmit.edu.au). Phone: (03) 99257915.

PhD student, Huong Thi Bao Dinh, School of Education, College of Social Design and Context.

Contact details: Room 220.2.12, School of Education, Bundoora West, RMIT University, VIC 3083. Email: [xxxxxxx@student.rmit.edu.au](mailto:xxxxxxx@student.rmit.edu.au). Phone: (03) 99257810

### Dear Hanoi University EFL teacher,

You are invited to participate in a research project being conducted by RMIT University. Please read this sheet carefully and be confident that you understand its contents before deciding whether to participate. If you have any questions about the project, please ask one of the investigators.

### Who is involved in this research project? Why is it being conducted?

My name is Huong Thi Bao Dinh and I am a full-time PhD student in the School of Education, College of Social Design and Context, RMIT University. I am working on this research project as part of the Degree for Doctor of Education (DR 071) under the supervision of Dr Kathy Jordan and Dr Jennifer Elsden-Clifton, senior lecturers in the School of Education.

The project has been approved by the RMIT Human Research Ethics Committee (Number: CHEAN B-2000716-06/12)

### Why have you been approached?

You have been approached with this invitation because you are the EFL teacher at Hanoi University, who is the subject of this research project.

### What is the project about? What are the questions being addressed?

This project is a mixed methods study on the factors that affect EFL teachers' integration of ICT in classroom practice in Hanoi University. The aims are to investigate the factors and to seek recommendations so better support can be provided to teachers to make classroom teaching more beneficial to students. The project is guided by the primary research question: "What are the factors affecting EFL teachers' integration of ICT in classroom practice?"

This study seeks the involvement of the EFL teachers from the English Department and Foundation Studies Department.

### If you agree to participate, what will you be required to do?

If you do agree to participate, you will be required to complete a questionnaire. It will take about 20 minutes to complete the questionnaire. In completing the questionnaire, you are required to tick the responses for close-ended items. The questions will mainly focus on the factors that affect your integration of ICT in classroom practice.

### What are the possible risks or disadvantages?

Taking part in this research study will pose no risks outside your day-to-day normal teaching practice to the best of my knowledge. However, if you are unduly concerned about your responses to any of the questionnaire items or if you find participation in the project distressing, you should contact the primary researcher Dr Kathy Jordan (contact details above) as soon as convenient. Dr Kathy Jordan will discuss your concerns with you confidentially and suggest appropriate follow-up, if necessary.

**What are the benefits associated with participation?**

Participation in this project may be of benefit to you in the sense that you will have a chance to voice your opinion and to seek support from the administrators of the university to better use ICT in your classroom practice.

**What will happen to the information provided?**

To protect your privacy, you will remain anonymous in the questionnaire. The information will be strictly kept confidential in a secured place.

Any information that you provide can be disclosed only if (1) it is to protect you or others from harm, (2) a court order is produced, or (3) you provide the researchers with written permission.

The results of this research project will be disseminated in the PhD thesis and/or conference papers and journal articles. The research data will be kept securely at RMIT for 5 years after publication, before being destroyed.

**What are the rights of a participant?**

Being in this study is completely voluntary; you are under no obligation to consent to participation. If you do decide to participate, you may withdraw at any stage or to avoid answering questions which you feel are too personal and intrusive.

Upon request, I will provide you with the written transcription of questionnaires for member-checking before I use it in my research and the data of the study once it is finished.

If you are not sure about any questions in the questionnaire, you can omit that question.

**Contact details for any questions or concerns?**

If you have any questions about the research project, please contact the primary investigator, Dr Kathy Jordan, or the PhD student, Huong Thi Bao Dinh with the contact details above.

If you have any complaints about your participation in this project, please see the complaints procedure on the [Complaints with respect to participation in research at RMIT](#) page

**What are other ethical issues?**

There will be no foreseeable issue that you should be aware of before deciding to participate in this research project.

**Yours sincerely,**

Kathy Jordan

Jennifer Elsdon-Clifton

(PhD)

Huong Thi Bao Dinh

(PhD student)

If you have any concerns about your participation in this project, which you do not wish to discuss with the researchers, then you can contact the Ethics Officer, Research Integrity, Governance and Systems, RMIT University, GPO Box 2476V VIC 3001. Tel: (03) 9925 2251 or email [human.ethics@rmit.edu.au](mailto:human.ethics@rmit.edu.au)

## **Appendix 8: A sample of interview questions**

### **English version:**

1. Can you please tell me your opinion on role of ICT in your English teaching? (teacher-related factor)
2. Some teachers of English say their English knowledge does have an influence on their integration of ICT in their teaching because most of the technical instructions are in English. Do you agree? (teacher-related factor)
3. Some teachers say their students' technical knowledge and skills affect their ICT integration in classroom teaching. What's your comment? (student-related factors)
4. In what ways do you think your colleagues affect your ICT use in classroom instruction? (peer-related factor)
5. Is there technical support from technicians? During class hour? Or out of class hours? (technician-related factors)
6. How does the university and department policies influence the way you integrate ICT in your teaching? (administrator-related factors)
7. Can you please tell me how you professionally develop when it comes to ICT integration in your English teaching? (administrator-related factors)
8. Do you think your knowledge/skills affect the way you use ICT in your teaching? In what ways? (teachers-related factors-TPACK)
9. Can you give me an example of how you use ICT in your classroom instruction?

Thank you for taking part in the interview!

### **Vietnamese version:**

1. Xin thầy/cô cho biết ý kiến của mình về vai trò của công nghệ thông tin trong giảng dạy tiếng Anh?
2. Một số giáo viên nói rằng chính kiến thức tiếng Anh của họ có ảnh hưởng đến việc họ sử dụng công nghệ thông tin trong giảng dạy. Ý kiến của thầy cô như thế nào?
3. Một số giáo viên cho rằng trình độ và kiến thức công nghệ của sinh viên ảnh hưởng đến việc giáo viên sử dụng công nghệ thông tin trên lớp. Thầy cô nghĩ thế nào về ý kiến này?

4. Thầy/cô nghĩ rằng đồng nghiệp của thầy cô ảnh hưởng đến việc thầy cô sử dụng công nghệ thông tin vào giảng dạy trên lớp như thế nào?
5. Thầy/cô có nhận được trợ giúp từ các kỹ thuật viên không? Trên lớp? ngoài giờ?
6. Các quy định và chính sách của trường cũng như của khoa ảnh hưởng đến việc thầy cô sử dụng công nghệ thông tin như thế nào?
7. Xin thầy/ cô cho biết thầy/cô đã tham gia bồi dưỡng chuyên môn để sử dụng công nghệ thông tin vào giảng dạy như thế nào?
8. Thầy/cô có nghĩ rằng trình độ và kiến thức của chính thầy/cô có ảnh hưởng đến việc thầy/cô sử dụng công nghệ thông tin trong giảng dạy hay không?
9. Thầy/cô có thể cho tôi một ví dụ về việc thầy/cô sử dụng công nghệ thông tin trong giảng dạy tiếng Anh trên lớp được không?

Xin cảm ơn thầy/cô đã tham gia trả lời phỏng vấn

# Appendix 9: Plain Language Statement for interviews

## PARTICIPANT INFORMATION

**Project Title: Factors affecting English as a Foreign Language (EFL) teachers' integration of Information and Communication Technology (ICT) in classroom practice: A case study of Hanoi University**

Dr Kathy Jordan, School of Education, College of Social Design and Context.

Contact details: Room: 220.3.11. School of Education, Bundoora West, RMIT University, VIC 3083.  
Email: [kathy.jordan@rmit.edu.au](mailto:kathy.jordan@rmit.edu.au). Phone: (03) 99257813.

Dr Jennifer Elsdon-Clifton, School of Education, College of Social Design and Context

Contact details: Room: 220.4.09. School of Education, Bundoora West, RMIT University, VIC 3083.  
Email: [Jennifer.elsden-clifton@rmit.edu.au](mailto:Jennifer.elsden-clifton@rmit.edu.au). Phone: (03) 99257915.

PhD student, Huong Thi Bao Dinh, School of Education, College of Social Design and Context.

Contact details: Room 220.2.12, School of Education, Bundoora West, RMIT University, VIC 3083. Email: [xxxxxxx@student.rmit.edu.au](mailto:xxxxxxx@student.rmit.edu.au). Phone: (03) 99257810

**Dear Hanoi University EFL teacher,**

You are invited to participate in a research project being conducted by RMIT University. Please read this sheet carefully and be confident that you understand its contents before deciding whether to participate. If you have any questions about the project, please ask one of the investigators.

**Who is involved in this research project? Why is it being conducted?**

My name is Huong Thi Bao Dinh and I am a full-time PhD student in the School of Education, College of Social Design and Context, RMIT University. I am working on this research project as part of the Degree for Doctor of Education (DR 071) under the supervision of Dr Kathy Jordan and Dr Jennifer Elsdon-Clifton, senior lecturers in the School of Education.

The project has been approved by the RMIT Human Research Ethics Committee (Number: CHEAN B-2000716-06/12)

**Why have you been approached?**

You have been approached with this invitation because you are the EFL teacher at Hanoi University, who is the subject of this research project.

**What is the project about? What are the questions being addressed?**

This project is a mixed methods study on the factors that affect EFL teachers' integration of ICT in classroom practice in Hanoi University. The aims are to investigate the factors and to seek recommendations so better support can be provided to teachers to make classroom teaching more beneficial to students. The project is guided by the primary research question: "What are the factors affecting EFL teachers' integration of ICT in classroom practice?"

This study seeks the involvement of EFL teachers from the English Department and Foundation Studies Department.

**If you agree to participate, what will you be required to do?**

If you do agree to participate, you will be required to take part in an interview. It will take about 30-45 minutes to answer the interview questions. In the audio-taped interview, you will be required to discuss with the researcher on the factors that affect your ICT integration such as your beliefs about the benefits and ease of use of ICT, the kind of professional development you engage in for teaching with ICT, technical support you are provided.

**What are the possible risks or disadvantages?**

Taking part in this research study will pose no risks outside your day-to-day normal teaching practice to the best of my knowledge. However, if you are unduly concerned about your responses to any of the questionnaire items or if you find participation in the project distressing, you should contact the primary researcher Dr Kathy Jordan (contact details above) as soon as convenient. Dr Kathy Jordan will discuss your concerns with you confidentially and suggest appropriate follow-up, if necessary.

**What are the benefits associated with participation?**

Participation in this project may be of benefit to you in the sense that you will have a chance to voice your opinion and to seek support from the administrators of the university to better use ICT in your classroom practice.

**What will happen to the information provided?**

To protect your privacy, the data will be coded and pseudonyms will be used so that individuals are not identified. The information will be strictly kept confidential in a secured place.

Any information that you provide can be disclosed only if (1) it is to protect you or others from harm, (2) a court order is produced, or (3) you provide the researchers with written permission.

The results of this research project will be disseminated in the PhD thesis and/or conference papers and journal articles. The research data will be kept securely at RMIT for 5 years after publication, before being destroyed.

**What are the rights of a participant?**

Being in this study is completely voluntary; you are under no obligation to consent to participation. If you do decide to participate, you may withdraw at any stage or to avoid answering questions which you feel are too personal and intrusive.

I will provide you with the written transcription of interviews for member-checking before I use it in my research and the data of the study once it is finished.

In the interview, you can ask the researcher any questions such as for the purpose of clarification.

**Contact details for any questions or concerns?**

If you have any questions about the research project, please contact the primary investigator, Dr Kathy Jordan, or the PhD student, Huong Thi Bao Dinh with the contact details above.

If you have any complaints about your participation in this project, please see the complaints procedure on the [Complaints with respect to participation in research at RMIT](#) page

**What are other ethical issues?**

There will be no foreseeable issue that you should be aware of before deciding to participate in this research project.

Yours sincerely,

Kathy Jordan

Jennifer Elsdon-Clifton

(PhD)

Huong Thi Bao Dinh

(PhD student)

If you have any concerns about your participation in this project, which you do not wish to discuss with the researchers, then you can contact the Ethics Officer, Research Integrity, Governance and Systems, RMIT University, GPO Box 2476V VIC 3001. Tel: (03) 9925 2251 or email [human.ethics@rmit.edu.au](mailto:human.ethics@rmit.edu.au)

## Appendix 10: Consent form

### CONSENT FOR EFL TEACHERS' INTERVIEWS

1. I have had the project explained to me, and I have read the information sheet
2. I agree to participate in the research project as described
3. I agree:  
to be interviewed  
that my voice will be audio recorded
4. I acknowledge that:
  - (a) I understand that my participation is voluntary and that I am free to withdraw from the project at any time and to withdraw any unprocessed data previously supplied (unless follow-up is needed for safety).
  - (b) The project is for the purpose of research. It may not be of direct benefit to me.
  - (c) The privacy of the personal information I provide will be safeguarded and only disclosed where I have consented to the disclosure or as required by law.
  - (d) The security of the research data will be protected during and after completion of the study. The data collected during the study may be published, and a report of the project outcomes will be provided to the university library. Any information which will identify me will not be used.

#### Participant's Consent

Name

Date

\_\_\_\_\_  
(Signature)

Participants should be given a photocopy of this PICF after it has been signed.

If you have any concerns about your participation in this project, which you do not wish to discuss with the researchers, then you can contact the Ethics Officer, Research Integrity, Governance and Systems, RMIT University, GPO Box 2476V VIC 3001. Tel: (03) 9925 2251 or email [human.ethics@rmit.edu.au](mailto:human.ethics@rmit.edu.au)



# Appendix 11: Verification of interview quotes translation by NAATI-translator

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Hoang Minh Do  
Professional translator (Vietnamese to/from English) - NAATI number 34305  
Phone: 0402519726  
Email: [dominhhoang@yahoo.com](mailto:dominhhoang@yahoo.com)

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***To whom it may concern***

RE: Verification of English translation from Vietnamese

Please be advised that I, Hoang Minh Do, being NAATI accredited professional translator (Vietnamese to/from English, no 34305), have audited the English translations of the quotes from interviews, and certify that the translations are true and correct.

---



Yours sincerely,

Hoang Minh Do



## Appendix 12A: Correlation matrix of questionnaire items on ICT applications

Items	1	2	3	4	5	6	7	8	9
1	1.000	.198	.175	.163	.276	.151	.266	-.008	-.007
2	.198	1.000	.288	.277	.251	-.061	.244	.291	.145
3	.175	.288	1.000	.161	.169	.279	.149	.045	-.053
4	.163	.277	.161	1.000	<b>.358</b>	.228	.265	<b>.369</b>	.282
5	.276	.251	.169	<b>.358</b>	1.000	<b>.329</b>	.256	<b>.386</b>	.192
6	.151	-.061	.279	.228	.329	1.000	.196	.249	.078
7	.266	.244	.149	.265	.256	.196	1.000	.127	.189
8	-.008	.291	.045	<b>.369</b>	<b>.386</b>	.249	.127	1.000	<b>.711</b>
9	-.007	.145	-.053	.282	.192	.078	.189	<b>.711</b>	1.000

## Appendix 12B: Correlation matrix of questionnaire items on Factors Influencing Teachers' Use of ICT

Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1	1.000	<b>.462</b>	.296	.177	<b>.401</b>	<b>.363</b>	<b>.301</b>	.198	.124	.131	.116	.196	.148	.172	.186	.038	.020	.134	.180	<b>.368</b>	<b>.327</b>	.039	.007	-.054	.110	.076	.003
2	<b>.462</b>	1.000	<b>.601</b>	.283	<b>.355</b>	.179	.084	<b>.321</b>	<b>.413</b>	.242	.392	.205	.245	.168	.280	.289	.258	<b>.438</b>	<b>.377</b>	<b>.457</b>	<b>.548</b>	<b>.445</b>	<b>.425</b>	<b>.342</b>	<b>.489</b>	<b>.482</b>	<b>.391</b>
3	.296	<b>.601</b>	1.000	.209	<b>.331</b>	.223	-.008	.234	<b>.386</b>	.228	.179	.192	.128	.085	.145	.217	.214	.258	<b>.362</b>	<b>.356</b>	<b>.475</b>	<b>.319</b>	<b>.315</b>	<b>.331</b>	<b>.337</b>	<b>.402</b>	.298
4	.177	.283	.209	1.000	.274	<b>.381</b>	<b>.505</b>	<b>.584</b>	.136	.267	.154	<b>.631</b>	<b>.582</b>	<b>.738</b>	<b>.487</b>	<b>.411</b>	<b>.304</b>	.265	<b>.337</b>	.134	.140	.120	.145	.115	.047	.297	.192
5	<b>.401</b>	<b>.355</b>	<b>.331</b>	.274	1.000	<b>.342</b>	.096	.133	.075	.025	.061	<b>.303</b>	.192	.289	<b>.318</b>	.016	.091	.098	.181	<b>.428</b>	<b>.418</b>	.217	.099	.032	.182	.260	.078
6	<b>.363</b>	.179	.223	<b>.381</b>	<b>.342</b>	1.000	.282	.277	<b>.337</b>	.153	.078	.234	.155	<b>.311</b>	.209	.161	.065	.084	.292	.235	.212	.278	.215	.085	.198	.155	.186
7	<b>.301</b>	.084	-.008	<b>.505</b>	.096	.282	1.000	<b>.403</b>	-.042	.021	-.091	<b>.386</b>	.296	<b>.358</b>	.055	.053	.020	.031	.115	.008	.052	-.027	-.087	-.048	-.167	-.002	.016
8	.198	<b>.321</b>	.234	<b>.584</b>	.133	.277	<b>.403</b>	1.000	.131	.176	.110	<b>.362</b>	<b>.351</b>	<b>.342</b>	.276	<b>.315</b>	.229	.230	.254	.234	.233	.160	.067	.028	.054	.225	.258
9	.124	<b>.413</b>	<b>.386</b>	.136	.075	<b>.337</b>	-.042	.131	1.000	<b>.493</b>	<b>.586</b>	.217	.109	.101	.257	<b>.415</b>	<b>.469</b>	<b>.450</b>	<b>.476</b>	.293	.123	<b>.341</b>	<b>.405</b>	<b>.471</b>	<b>.417</b>	<b>.420</b>	<b>.389</b>
10	.131	.242	.228	.267	.025	.153	.021	.176	<b>.493</b>	1.000	<b>.642</b>	<b>.490</b>	<b>.345</b>	<b>.319</b>	<b>.329</b>	<b>.526</b>	<b>.519</b>	<b>.451</b>	<b>.404</b>	.270	.125	.125	<b>.345</b>	<b>.325</b>	<b>.199</b>	<b>.400</b>	<b>.349</b>
11	.116	<b>.392</b>	.179	.154	.061	.078	-.091	.110	<b>.586</b>	<b>.642</b>	1.000	<b>.320</b>	<b>.307</b>	.265	<b>.408</b>	<b>.508</b>	<b>.465</b>	<b>.462</b>	<b>.421</b>	.299	.208	.262	<b>.303</b>	<b>.371</b>	<b>.343</b>	<b>.452</b>	<b>.391</b>
12	.196	.205	.192	<b>.631</b>	<b>.303</b>	.234	<b>.386</b>	<b>.362</b>	.217	<b>.490</b>	<b>.320</b>	1.000	<b>.784</b>	<b>.646</b>	<b>.355</b>	<b>.314</b>	.275	.279	<b>.355</b>	.202	.146	.057	.162	.189	-.038	<b>.321</b>	.122
13	.148	.245	.128	<b>.582</b>	.192	.155	.296	<b>.351</b>	.109	<b>.345</b>	<b>.307</b>	<b>.784</b>	1.000	<b>.594</b>	<b>.377</b>	.272	.140	.239	<b>.325</b>	.192	.220	.064	.114	.140	-.002	.289	.053
14	.172	.168	.085	<b>.738</b>	.289	<b>.311</b>	<b>.358</b>	<b>.342</b>	.101	<b>.319</b>	.265	<b>.646</b>	<b>.594</b>	1.000	<b>.463</b>	<b>.489</b>	<b>.362</b>	<b>.333</b>	<b>.328</b>	.095	.174	.140	.225	.212	.099	.280	.198
15	.186	.280	.145	<b>.487</b>	<b>.318</b>	.209	.055	.276	.257	<b>.329</b>	<b>.408</b>	<b>.355</b>	<b>.377</b>	<b>.463</b>	1.000	<b>.440</b>	<b>.339</b>	<b>.403</b>	<b>.507</b>	.215	.250	.265	.228	.160	.208	.291	.195
16	.038	.289	.217	<b>.411</b>	.016	.161	.053	<b>.315</b>	<b>.415</b>	<b>.526</b>	<b>.508</b>	<b>.314</b>	.272	<b>.489</b>	<b>.440</b>	1.000	<b>.634</b>	<b>.711</b>	<b>.545</b>	.222	.080	<b>.312</b>	<b>.399</b>	<b>.488</b>	<b>.335</b>	<b>.522</b>	<b>.513</b>
17	.020	.258	.214	<b>.304</b>	.091	.065	.020	.229	<b>.469</b>	<b>.519</b>	<b>.465</b>	.275	.140	<b>.362</b>	<b>.339</b>	<b>.634</b>	1.000	<b>.657</b>	<b>.537</b>	.160	.081	.293	<b>.368</b>	<b>.433</b>	<b>.326</b>	<b>.564</b>	<b>.542</b>
18	.134	<b>.438</b>	.258	.265	.098	.084	.031	.230	<b>.450</b>	<b>.451</b>	<b>.462</b>	.279	.239	<b>.333</b>	<b>.403</b>	.711	<b>.657</b>	1.000	.731	.281	.160	<b>.416</b>	<b>.555</b>	<b>.514</b>	<b>.479</b>	<b>.635</b>	<b>.514</b>
19	.180	<b>.377</b>	<b>.362</b>	<b>.337</b>	.181	.292	.115	.254	<b>.476</b>	<b>.404</b>	<b>.421</b>	<b>.355</b>	<b>.325</b>	<b>.328</b>	<b>.507</b>	<b>.545</b>	<b>.537</b>	.731	1.000	.233	.240	<b>.532</b>	<b>.582</b>	<b>.535</b>	<b>.516</b>	<b>.648</b>	<b>.460</b>
20	<b>.368</b>	<b>.457</b>	<b>.356</b>	.134	<b>.428</b>	.235	.008	.234	.293	.270	.299	.202	.192	.095	.215	.222	.160	.281	.233	1.000	<b>.575</b>	.225	.177	.240	.234	<b>.305</b>	.184
21	<b>.327</b>	<b>.548</b>	<b>.475</b>	.140	<b>.418</b>	.212	.052	.233	.123	.125	.208	.146	.220	.174	.250	.080	.081	.160	.240	<b>.575</b>	1.000	<b>.336</b>	.194	.209	.209	.289	.167
22	.039	<b>.445</b>	<b>.319</b>	.120	.217	.278	-.027	.160	<b>.341</b>	.125	.262	.057	.064	.140	.265	<b>.312</b>	.293	<b>.416</b>	<b>.532</b>	.225	<b>.336</b>	1.000	<b>.694</b>	<b>.580</b>	<b>.446</b>	<b>.568</b>	<b>.524</b>
23	.007	<b>.425</b>	<b>.315</b>	.145	.099	.215	-.087	.067	<b>.405</b>	<b>.345</b>	<b>.303</b>	.162	.114	.225	.228	<b>.399</b>	<b>.368</b>	<b>.555</b>	<b>.582</b>	.177	.194	<b>.694</b>	1.000	.721	<b>.510</b>	<b>.563</b>	<b>.565</b>
24	-.054	<b>.342</b>	<b>.331</b>	.115	.032	.085	-.048	.028	<b>.471</b>	<b>.325</b>	<b>.371</b>	.189	.140	.212	.160	<b>.488</b>	<b>.433</b>	<b>.514</b>	<b>.535</b>	.240	.209	<b>.580</b>	.721	1.000	<b>.521</b>	<b>.551</b>	<b>.533</b>
25	.110	<b>.489</b>	<b>.337</b>	.047	.182	.198	-.167	.054	<b>.417</b>	.199	<b>.343</b>	-.038	-.002	.099	.208	<b>.335</b>	<b>.326</b>	<b>.479</b>	<b>.516</b>	.234	.209	<b>.446</b>	<b>.510</b>	<b>.521</b>	1.000	<b>.533</b>	<b>.465</b>
26	.076	<b>.482</b>	<b>.402</b>	.297	.260	.155	-.002	.225	<b>.420</b>	<b>.400</b>	<b>.452</b>	<b>.321</b>	.289	.280	.291	<b>.522</b>	<b>.564</b>	<b>.635</b>	<b>.648</b>	<b>.305</b>	.289	<b>.568</b>	<b>.563</b>	<b>.551</b>	<b>.533</b>	1.000	<b>.685</b>
27	.003	<b>.391</b>	.298	.192	.078	.186	.016	.258	<b>.389</b>	<b>.349</b>	<b>.391</b>	.122	.053	.198	.195	<b>.513</b>	<b>.542</b>	<b>.514</b>	<b>.460</b>	.184	.167	<b>.524</b>	<b>.565</b>	<b>.533</b>	<b>.465</b>	<b>.685</b>	1.000

## Appendix 12C: Correlation matrix of questionnaire items on teachers' TPACK

Items	TK1	TK2	TK3	CK1	CK2	CK3	PK1	PK2	PK3	PK4	PK5	PCK1	PCK2	TCK1	TCK2	TCK3	TPK1	TPK2	TPK3	TPK4	TPK5	TPACK1	TPACK2	TPACK3
TK1	1.000	.581	.389	.482	.357	.287	.385	.310	.293	.293	.277	.284	.346	.453	.399	.351	.363	.388	.372	.233	.156	.428	.458	.317
TK2	.581	1.000	.612	.366	.330	.198	.322	.114	.162	.241	.177	.230	.300	.291	.400	.254	.283	.354	.357	.097	.079	.272	.407	.326
TK3	.389	.612	1.000	.255	.278	.297	.286	.192	.268	.333	.157	.323	.213	.420	.409	.374	.325	.327	.255	.211	.220	.326	.407	.382
CK1	.482	.366	.255	1.000	.596	.382	.507	.410	.410	.368	.286	.368	.327	.369	.320	.394	.334	.219	.358	.203	.118	.235	.394	.167
CK2	.357	.330	.278	.596	1.000	.560	.470	.438	.488	.307	.342	.300	.364	.315	.302	.282	.251	.179	.211	.232	.225	.261	.285	.179
CK3	.287	.198	.297	.382	.560	1.000	.313	.280	.251	.216	.085	.240	.431	.096	.181	.386	.262	.051	-.015	.010	.017	.071	-.012	.235
PK1	.385	.322	.286	.507	.470	.313	1.000	.670	.454	.420	.348	.404	.347	.386	.510	.490	.426	.291	.031	.135	-.080	.138	.288	.264
PK2	.310	.114	.192	.410	.438	.280	.670	1.000	.522	.446	.502	.383	.386	.398	.310	.312	.270	.249	.119	.215	-.001	.271	.188	.167
PK3	.293	.162	.268	.410	.488	.251	.454	.522	1.000	.707	.584	.536	.450	.368	.306	.350	.372	.356	.221	.379	.290	.318	.325	.253
PK4	.293	.241	.333	.368	.307	.216	.420	.446	.707	1.000	.718	.497	.337	.368	.306	.321	.303	.356	.258	.557	.359	.349	.463	.253
PK5	.277	.177	.157	.286	.342	.085	.348	.502	.584	.718	1.000	.473	.355	.437	.197	.129	.221	.342	.264	.412	.366	.349	.366	.154
PCK1	.284	.230	.323	.368	.300	.240	.404	.383	.536	.497	.473	1.000	.577	.424	.457	.452	.405	.400	.228	.304	.280	.350	.377	.367
PCK2	.346	.300	.213	.327	.364	.431	.347	.386	.450	.337	.355	.577	1.000	.194	.202	.268	.213	.206	.086	.072	.036	.222	.129	.273
TCK1	.453	.291	.420	.369	.315	.096	.386	.398	.368	.368	.437	.424	.194	1.000	.779	.610	.554	.538	.441	.469	.577	.559	.491	.410
TCK2	.399	.400	.409	.320	.302	.181	.510	.310	.306	.306	.197	.457	.202	.779	1.000	.701	.643	.481	.377	.392	.356	.458	.436	.425
TCK3	.351	.254	.374	.394	.282	.386	.490	.312	.350	.321	.129	.452	.268	.610	.701	1.000	.668	.475	.311	.304	.317	.454	.390	.419
TPK1	.363	.283	.325	.334	.251	.262	.426	.270	.372	.303	.221	.405	.213	.554	.643	.668	1.000	.644	.448	.280	.378	.567	.463	.482
TPK2	.388	.354	.327	.219	.179	.051	.291	.249	.356	.356	.342	.400	.206	.538	.481	.475	.644	1.000	.614	.328	.467	.632	.549	.462
TPK3	.372	.357	.255	.358	.211	-.015	.031	.119	.221	.258	.264	.228	.086	.441	.377	.311	.448	.614	1.000	.361	.506	.540	.536	.309
TPK4	.233	.097	.211	.203	.232	.010	.135	.215	.379	.557	.412	.304	.072	.469	.392	.304	.280	.328	.361	1.000	.595	.389	.477	.278
TPK5	.156	.079	.220	.118	.225	.017	-.080	-.001	.290	.359	.366	.280	.036	.577	.356	.317	.378	.467	.506	.595	1.000	.565	.541	.352
TPACK1	.428	.272	.326	.235	.261	.071	.138	.271	.318	.349	.349	.350	.222	.559	.458	.454	.567	.632	.540	.389	.565	1.000	.643	.432
TPACK2	.458	.407	.407	.394	.285	-.012	.288	.188	.325	.463	.366	.377	.129	.491	.436	.390	.463	.549	.536	.477	.541	.643	1.000	.520
TPACK3	.317	.326	.382	.167	.179	.235	.264	.167	.253	.253	.154	.367	.273	.410	.425	.419	.482	.462	.309	.278	.352	.432	.520	1.000

## Appendix 13A: Eigenvalues for questionnaire items on ICT applications

**Total Variance Explained**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings <sup>a</sup>
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.771	30.794	30.794	2.771	30.794	30.794	2.320
2	1.497	16.630	47.424	1.497	16.630	47.424	2.165
3	1.080	12.003	59.427	1.080	12.003	59.427	1.232
4	.924	10.272	69.699				
5	.754	8.373	78.073				
6	.691	7.674	85.747				
7	.609	6.769	92.516				
8	.459	5.099	97.614				
9	.215	2.386	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

## Appendix 13B: Eigenvalues for questionnaire items on Factors influencing teacher use of ICT

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings <sup>a</sup>
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	8.941	33.114	33.114	8.941	33.114	33.114	6.457
2	3.401	12.598	45.711	3.401	12.598	45.711	4.480
3	2.487	9.211	54.923	2.487	9.211	54.923	4.099
4	1.500	5.556	60.478	1.500	5.556	60.478	5.243
5	1.138	4.215	64.693	1.138	4.215	64.693	2.531
6	1.032	3.821	68.514	1.032	3.821	68.514	2.220
7	.983	3.641	72.155				
8	.781	2.893	75.048				
9	.736	2.726	77.774				
10	.713	2.640	80.414				
11	.604	2.235	82.650				
12	.570	2.113	84.762				
13	.554	2.050	86.812				
14	.484	1.792	88.605				
15	.441	1.634	90.238				
16	.376	1.393	91.632				
17	.352	1.305	92.937				
18	.304	1.127	94.064				
19	.292	1.082	95.146				
20	.251	.928	96.074				
21	.208	.770	96.844				
22	.195	.723	97.567				
23	.177	.656	98.224				
24	.139	.515	98.739				
25	.130	.483	99.222				
26	.118	.438	99.659				
27	.092	.341	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

## Appendix 13C: Eigenvalues for questionnaire items on teacher TPACK

**Total Variance Explained**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings <sup>a</sup>
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	9.085	37.854	37.854	9.085	37.854	37.854	6.708
2	2.672	11.133	48.987	2.672	11.133	48.987	3.130
3	1.932	8.051	57.038	1.932	8.051	57.038	5.657
4	1.359	5.661	62.699	1.359	5.661	62.699	5.114
5	1.084	4.515	67.214	1.084	4.515	67.214	1.217
6	1.057	4.404	71.619	1.057	4.404	71.619	3.424
7	.933	3.887	75.506				
8	.694	2.890	78.396				
9	.637	2.655	81.051				
10	.625	2.603	83.654				
11	.536	2.234	85.888				
12	.466	1.940	87.827				
13	.430	1.792	89.620				
14	.397	1.654	91.273				
15	.368	1.534	92.807				
16	.310	1.290	94.097				
17	.277	1.156	95.253				
18	.258	1.076	96.329				
19	.219	.912	97.240				
20	.190	.790	98.031				
21	.173	.722	98.752				
22	.143	.594	99.347				
23	.093	.389	99.735				
24	.064	.265	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.