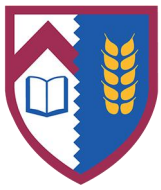
Hong Kong EFL Pre-service Teachers' Readiness for Technology Integration into Future Teaching Practices: An Explanatory Sequential Mixed Methods Study

Wenjin Wang
Kellogg College



A dissertation submitted for the degree of
MSc Education (Digital and Social Change)
August 2023

DECLARATION BY THE CANDIDATE AS AUTHOR OF THE DISSERTATION

1. I understand that I am the owner of this dissertation and that the copyright rests with me unless I specifically transfer it to another person.
2. I allow the Department to deposit on my behalf a copy of this dissertation in the Oxford University Research Archive ('ORA') where it shall be freely available online for use in accordance with ORA's Terms and Conditions of Use [https://ora.ox.ac.uk/terms_of_use].
3. I understand that this dissertation should not contain material that can be used to personally identify individuals or specific groups of individuals (unless permission has been obtained from the individuals) and that such material should be removed before this dissertation is deposited in ORA.
4. I agree to be bound by the terms of the ORA Grant of Non-exclusive Licence [https://ora.ox.ac.uk/deposit_agreements] and I warrant that to the best of my knowledge, making my thesis available on the internet will not infringe copyright or any other rights of any other person or party, nor contain defamatory material.
5. I agree that my dissertation shall be available for download in ORA in accordance with paragraphs 2, 3 and 4 above.

Signed [an electronic signature is sufficient]:	
Date:	2023.8.9

Abstract

The significance of integrating Information and Communication Technology (ICT) into English as a Foreign Language (EFL) education is widely recognised in modern EFL teaching practices. Teachers are expected to demonstrate professional expertise and proficiency in digital skills from the outset of their teaching careers. This requirement has become particularly prominent in the aftermath of the outbreak of the COVID-19 pandemic, which forced a shift from physical classrooms to online platforms. However, there has been limited research examining whether EFL pre-service teachers are ready for technology integration before they enter actual classrooms.

Using an explanatory mixed methods research design, this study investigates the readiness for technology integration of EFL pre-service teachers from two universities in Hong Kong by exploring their knowledge, self-efficacy, and prior experience in technology integration. An online questionnaire is designed to examine their Technological Pedagogical Content Knowledge (TPACK) and self-efficacy for integrating technology into EFL teaching. Follow-up interviews are conducted to understand participants' self-reported survey results and factors that influence their readiness levels.

The synthesis of quantitative and qualitative findings reveals that pre-service teachers' readiness for technology integration is influenced by a blend of experiential and contextual factors, with their technological experiences during teaching practicums playing a prominent role. While the majority of EFL pre-service teachers exhibit a moderate level of preparedness, the considerable disparities in readiness, particularly between the highest and lowest scores, underscore the necessity of teacher-training programmes to enhance their readiness for technology integration in their future classrooms. These findings hold theoretical significance as they offer a holistic perspective, combining knowledge-based and self-efficacy-based insights, into the factors influencing the varying levels of pre-service teachers' technology integration readiness. Additionally, this dissertation offers practical suggestions for teacher-training programmes. These include diversifying ICT courses for pre-service teachers, furnishing comprehensive professional training to both teacher educators and pre-service teachers on integrating content, pedagogy, and technology effectively, and fostering pre-service teachers' ability to address technical issues and meet the varied needs of their students. Moreover, considering participants' eagerness for continuous professional growth, this study contends that teacher-training programmes should facilitate communication and collaboration among pre-service teachers across universities and afford them opportunities to attend cutting-edge technology exhibitions, thereby immersing them in innovative teaching practices.

Keywords: Technology integration readiness, EFL pre-service teachers, self-efficacy, TPACK.

Acknowledgement

First and foremost, I would like to express my profound gratitude for the invaluable contributions of Professor Rebecca Eynon. I consider myself incredibly fortunate to have had Rebecca as my supervisor, as she has consistently provided unwavering support, responsiveness, and genuine care throughout my academic journey. I am truly grateful for her remarkable supervision, which provided a beacon of inspiration during challenging times.

Special gratitude is extended to all the amazing people I have encountered at the Department of Education — my heartfelt thanks to the exceptional lecturers, patient librarians, and my supportive classmates. Your presence and contributions have made this year truly memorable and enriching!

My deep gratitude also goes to my loving families, whose unconditional love has taught me that retreat is not a sign of weakness. Their love has also given me the courage and confidence to choose to move forward and face challenges head-on. It is because of their love that I am empowered to persevere and overcome obstacles with determination.

Finally, I would like to express my gratitude to myself for the perseverance and hard work throughout this year. I have learned the importance of resilience, as reflected in the proverbial saying, “the light boat has already sailed over a thousand mountains.” The road ahead may be long, but it is filled with endless possibilities and opportunities. I am committed to continuously expanding the boundaries of my knowledge and striving to become a person who can contribute to the betterment of the world.

Table of Contents

Lists of Tables 6
List of Figures 6
List of Abbreviations 7
Chapter 1: Introduction 8
1.1 Research Background and Rationale 8
1.2 Thesis Structure 10
Chapter 2: Literature Review 11
2.1 Technology Integration in Education 11
2.1.1 Technology Integration in EFL Teaching and Learning 12
2.1.2 Technology Integration in Hong Kong EFL Classrooms 13
2.2 Factors Influencing Pre-Service Teachers' Technology Integration 15
2.2.1 External Factors 15
2.2.2 Internal Factors 16
2.3 Theoretical Framework 17
2.3.1 Self-efficacy Theory 18
2.3.2 TPACK Model 20
2.4 Research Questions 22
Chapter 3: Methodology 23
3.1 Research Design 23
3.1.1 Rationale for Adopting A Mixed Methods Approach 23
3.1.2 Sequential Explanatory Design 24
3.2 Participants and Sampling 25
3.2.1 Description of Participants 25
3.2.2 Sequential Mixed Methods Sampling 25
3.3 Research Instruments 26
3.3.1 Online Questionnaire 26
3.3.2 Semi-structured Interviews 27
3.4 Data Analysis 30
3.4.1 Quantitative Data Analysis 30
3.4.2 Qualitative Data Analysis 30
3.4.3 Mixed Analysis of Quantitative and Qualitative Results 32
3.5 Ethical Considerations 32
3.6 Limitations 33
3.7 Chapter Summary 34
Chapter 4 Findings and Discussion 35

4.1 Quantitative Results 35
4.1.1 A Profile of the Participants 35
4.1.2 Participants' Readiness Levels for Technology Integration 38
4.1.3 An Analysis of Survey Results 38
4.2 Qualitative Results 40
4.2.1 Theme 1: Practicum Experiences 42
4.2.2 Theme 2: Lecture Experiences 47
4.2.3 Theme 3: E-trend 49
4.2.4 An Overview of Interview Results 51
4.3 Synthesising Quantitative and Qualitative Findings: Toward a Comprehensive Integration 52
Chapter 5: Conclusion and Future Implications 58
5.1 Summary of the Findings 58
5.2 Theoretical and Practical Implications 59
5.3 Recommendations for Future Research 61
References 63
Appendix A Online Questionnaire 75
Appendix B Interview Protocols 83
Appendix C Ethical Approval 86
Appendix D Interview Information Sheet 87
Appendix E Interview Consent Forms 90
Appendix F Ranking of Survey Statements 91

Lists of Tables

Table 3.1 Interview Protocol Related to Self-efficacy 28
Table 3.2 A Profile of EFL Pre-service Teachers (n = 40) 29
Table 4.1 Types of Technology Used During Teaching Practicum (n =40) 36
Table 4.2 A Profile of Interview Participants 37
Table 4.3 A Joint Display of Interview Quotes Related to EFL Pre-service 40
Table 4.4 Teachers' Self-reported Level of Self-efficacy and TPACK 53

List of Figures

Figure 2.1 The TPACK Framework 20
Figure 3.1 The Participant Selection Model of Explanatory Design 24
Figure 3.2 Six Phrases of Thematic Analysis 31
Figure 4.1 The Proportion of Three Readiness Groups 38
Figure 4.2 Thematic Map: Influencing Factors for EFL Pre-service Teachers' Technology Integration Readiness 41
Figure 4.3 Sub-themes of Theme 1: Practicum Experiences 43
Figure 4.4 Sub-themes of Theme 2: Lecture Experiences 47
Figure 4.5 Sub-themes of Theme 3: E-trend 49
Figure 4.6 A Visual Map of Influencing Factors on EFL Pre-service Teachers' Readiness for Technology Integration 51
Figure 4.7 A Visual Diagram: Interrelation of TPACK, Self-Efficacy, Participants' Prior Experiences/Training, and Readiness Levels 55

List of Abbreviations

CDC	Curriculum Development Council
CK	Content Knowledge
CTIS	Computer Technology Integration Survey
ITEd	Information Technology in Education
PCK	Pedagogical Content Knowledge
PK	Pedagogical Knowledge
EDB	Education Bureau
TAM	Technology Acceptance Model
TCK	Technological Content Knowledge
TK	Technological Knowledge
TPB	Theory of Planned Behaviour
TPK	Technological Pedagogical Knowledge
TPACK	Technological Pedagogical (and) Content Knowledge

Chapter 1: Introduction

1.1 Research Background and Rationale

Since the launch of microcomputers in schools in 1981, there have been perennial debates over the justification for using Information and Communication Technology (ICT) in education (Wellington, 2005). Even after four decades, the question of how ICT can be successfully integrated into the classroom and benefit teachers and students remains relevant today. In particular, the onset of the COVID-19 pandemic has brought the discourse on technology integration in educational settings to the forefront. Recent research has examined teachers' technical and pedagogical skills in the context of digitalisation during the COVID-19 crisis. Interestingly, Schuknecht and Schleicher's (2020) study revealed that teachers from OECD countries struggled to integrate ICT into their teaching during the COVID-19 school closures and that considerable investment should be made to improve their ICT competencies. Consistent with this discovery, investigations carried out in Portugal (Sá & Serpa, 2020) and Germany (König et al., 2020) showed that the majority of teachers lacked sufficient training and competence to successfully implement online teaching during the pandemic. However, there is limited literature on the ICT competence and confidence of teachers in non-OECD member countries, particularly their ability to integrate technology into future teaching practices. This study aims to fill this research gap by focusing on teachers in Hong Kong, China.

With the rapid development of ICT, the technology used in classrooms discussed in recent studies refers to a myriad of digital technologies, including computing hardware (such as computers, laptops, and smart whiteboards), software packages (such as spreadsheets and simulation programmes), and worldwide web applications (Selwyn, 2016). Extensive research has been conducted in various countries on in-service teachers' perceptions and practices of these digital technologies in different disciplines (e.g., Chen & Tsai, 2021; Nath, 2019; Wang, 2021). However, scant attention has been paid to how English as a Foreign Language (EFL) pre-service teachers integrate technology into their teaching practices. This study examines whether EFL pre-service teachers in Hong Kong have sufficient knowledge and skills to incorporate technology into their future classrooms.

The integration of technology in language teaching and learning has primarily been discussed within the field of Computer-Assisted Language Learning (CALL), which is defined by Levy (1997) as "the search for and study of the applications of computers in language teaching and learning" (p. 1). CALL has significantly influenced EFL teaching practices since the 1960s, when computers started being utilised for language instruction (Warschauer & Healey, 1998). With the popularity of mobile technologies such as smartphones, laptops, and tablets for language learning and teaching in both formal and informal educational contexts, CALL now includes the field of Mobile-Assisted Language Learning (MALL). Previous research has demonstrated the

positive effects of implementing MALL in EFL teaching and learning, including students' improved grammar skills (Moghari & Marandi, 2017), enhanced spelling proficiency (Shih et al., 2015), and expanded vocabulary (Çakmak & Erçetin, 2018). However, it is essential to note that merely using technology does not guarantee improved learning outcomes, as effectiveness depends on how technology is implemented in practice. This underlines teachers' crucial role in EFL classrooms and the significance of examining how they integrate technology within the instructional content, pedagogy, and overall teaching plan.

While teachers are expected to be professionally qualified and technologically nimble from the beginning of their careers, contemporary pre-service teachers, often referred to as the 'digital native' generation due to their extensive exposure to and use of technology, are still reported to lack the ability to effectively integrate technology into their teaching practices (Valtonen et al., 2017). Significantly, research on the impact of ICT courses offered in teacher training programmes has shown limited success in increasing pre-service teachers' use of technology in their subsequent classroom teaching (Hu, 2015). Regarding the ICT courses provided by their programmes, pre-service teachers conveyed their concern that the content related to ICT was insufficiently addressed and lacked comprehensive discussion (Jäger-Biela et al., 2020). Empirical studies have shown that pre-service teachers still perceive a lack of readiness to effectively incorporate technology into their classrooms (Ottenbreit-Leftwich et al., 2010; Tondeur et al., 2012, 2017). This underscores the need to understand the reasons for the disconnect between what preservice teachers are taught and their actual use of technology in real-world contexts.

To understand the disparity between expectations and reality, it is crucial to assess pre-service teachers' readiness for technology integration as well as the factors that influence their readiness. In a classroom setting, the teacher is regarded as a key driver for the successful integration of technology (Rehmat & Bailey, 2014; Teo, 2015). With a focus on teachers' readiness to integrate technology into their future classrooms, this paper adopts the definition of technology integration that highlights the role of teachers, namely "the use of technology in a teacher's regular teaching and curricular plans" (Cullen & Greene, 2011, p. 30). Readiness in this study refers to teachers' self-perceived confidence and competence to incorporate technology into their teaching practices. That is, whether teachers have been psychologically prepared and are practically competent to ensure effective technology integration. Previous studies have shown that teachers' readiness for technology integration is a multifaceted issue influenced by a plethora of external and internal factors such as self-efficacy, knowledge, and experiences in utilising technologies for teaching (see Section 2.2).

To thoroughly examine the readiness of pre-service teachers for integrating technology, this study recognises the significance of selecting a suitable conceptual model that facilitates the practical implementation of technology (Tondeur et al., 2020). Therefore, the Technological Pedagogical Content Knowledge (TPACK) model proposed by Mishra and Koehler (2006) is

utilised in this study as it provides a robust framework that highlights teachers' integrated understanding of technology, pedagogy, and subject matter in effective technology integration (Sun et al., 2017). In conjunction with the TPACK model, Bandura's (1997) self-efficacy theory is also applied because knowledge and skills alone do not guarantee successful technology integration. Bandura (1988) asserts that individuals must possess not only the necessary skills but also self-belief in their ability to leverage those skills. By combining self-efficacy theory and the TPACK model, this study aims to depict a comprehensive picture of EFL pre-service teachers' readiness for integrating technology into their future classrooms.

To achieve this goal, this study adopts an explanatory sequential mixed methods design where self-efficacy theory and the TPACK model are embedded as theoretical frameworks. An online questionnaire was developed to investigate the TPACK and self-efficacy of pre-service teachers concerning their integration of technology into English language instruction. Subsequent follow-up interviews were conducted to gain insights into participants' survey responses and to explore how their previous experiences and training shape their levels of preparedness.

1.2 Thesis Structure

This dissertation consists of five chapters, including this introduction chapter. Chapter 2 presents an in-depth literature review on technology integration in EFL teaching and learning. It explores the factors that influence pre-service teachers' readiness for technology integration and outlines how the self-efficacy theory and the TPACK model contribute to the investigation of Hong Kong EFL pre-service teachers' readiness for integrating technology into their future classrooms. This chapter also examines the current use and integration of technology in English classes by pre-service teachers in Hong Kong and the relevant education policies.

Chapter 3 introduces and justifies the sequential mixed methods research design and the corresponding research methods employed in this study. It provides an overview of the participants, the sampling procedure, and the research instruments. Additionally, the chapter explains the data analysis procedure, addresses ethical considerations, and acknowledges the limitations of the research.

Chapter 4 presents the research findings and critically discusses them in relation to the existing literature. Tables and qualitative diagrams are developed and analysed to enhance comprehension of how the quantitative, qualitative, and integrated results address the research questions.

Chapter 5 concludes the study by summarising the main findings, presenting theoretical and practical implications, and providing recommendations for future research on the readiness for technology integration among EFL pre-service teachers.

Chapter 2: Literature Review

This chapter begins with definitions of key terms employed in this study. Then, it reviews the literature on technology integration in EFL learning, where the research on Computer-Assisted Language Learning (CALL) and its associated terms will be discussed to highlight the evolving nature of the technology used for EFL and the significance of harnessing the strengths of both teachers and technology to facilitate teaching and learning. Following that, an examination of past research on EFL pre-service teachers' technology integration in the Hong Kong context will be conducted. Next, this chapter reports factors that influence pre-service teachers' technology integration. Lastly, this chapter presents the self-efficacy theory and the Technological Pedagogical and Content Knowledge (TPACK) model as theoretical frameworks and outlines how they help this study fill the research gap in investigating Hong Kong EFL pre-service teachers' readiness for technology integration into their future classrooms.

2.1 Technology Integration in Education

Successful technology integration leads to enhanced and enjoyable learning experiences for students (Farjon et al., 2019). However, merely incorporating technology into existing teaching practices is insufficient to achieve this goal. Some scholars suggest that the increased availability of technologies in schools does not necessarily yield improvements in teachers' teaching practices (Lim & Chai, 2008; Lowther et al., 2008). This is because that while technologies may offer opportunities to support student-centred instruction, teachers primarily use technologies to facilitate their traditional, teacher-centred teaching (Chen & Tsai, 2021; Graves & Bowers, 2018; Murthy et al., 2017; Van Broekhuizen, 2016), even in technology-rich schools (Palak & Walls, 2009). As a result, the efficacy of technology in enhancing teaching and learning is at risk of being compromised if its use remains congruent with teachers' conventional, didactic pedagogical beliefs (Wang et al., 2004). To achieve effective technology integration in education, a thoughtful approach must be adopted that considers the connection and interaction among technology, content, and pedagogy in a given context (Koehler & Mishra, 2009). This dissertation explores how pre-service teachers understand the relationship between technology, content, and pedagogy.

In this study, technology integration is considered successful when teachers follow a learner-centred approach (An & Reigeluth, 2011) and make meaningful use of technologies to achieve learning goals (Ottenbreit-Leftwich & Kimmons, 2020). However, 'meaningful use of technology' is inherently ambiguous within academic discourse. This study defines it as surpassing the mere incorporation of technological tools to replace conventional educational practices; rather, it encompasses innovative approaches that promote engagement, foster creativity, and stimulate critical thinking. For instance, a simple shift from using a blackboard to presenting class notes through PowerPoint reflects a less meaningful technology implementation than using online

collaboration tools for simultaneous knowledge co-construction. These tools enable students to actively participate and collaborate with their peers and teachers at a level of interaction that cannot be achieved solely through traditional pen-and-paper methods. Having defined what is meant by successful technology integration in education and meaningful use of technology, the next section reviews the research on the historical development of technology integration in EFL teaching and learning.

2.1.1 Technology Integration in EFL Teaching and Learning

Technology integration in language teaching and learning is primarily discussed within the discourse of Computer-Assisted Language Learning (CALL). Given the dynamic nature of computers, the concept of CALL is evolving to embody technological advances and innovative pedagogical approaches (Beatty, 2003; Godwin-Jones, 2021). A conceptual shift has been observed in the field of CALL as mobile technologies and devices become more accessible in educational and personal settings (Kern, 2006). This shift is reflected in Egbert's (2005, p. 4) definition of CALL, which means "learners learning language in any context with, through, and around computer technologies". Notably, this definition differs from Levy's (1997) earlier definition (see Section 1.1) by including all forms of mobile electronic technology and software. With the increasing use of mobile, portable technologies such as smartphones, laptops, and tablet computers for teaching and learning, the concept of mobile learning (M-learning) has gained popularity to describe the process of learning through handheld devices anywhere and anytime (Kukulska-Hulme & Shield, 2008). This concept is further developed into Mobile-Assisted Language Learning (MALL), which refers to the use of mobile technologies for language learning, especially when learners benefit from the portability of mobile devices and situated learning (Kukulska-Hulme, 2018). This study explores how EFL pre-service teachers handle these emerging mobile technologies for EFL teaching.

While the small size and portability of mobile devices are lauded for their benefits for language learning, these characteristics also limit their usability (Stockwell & Hubbard, 2013). Specifically, their small screen and input methods have been widely identified as the drawbacks of MALL (Chae & Kim, 2004; Chinnery, 2006). Other issues such as lack of human interaction, high costs of devices, limited data storage, short battery life, and slow data processing speed also raise concerns over the implementation of MALL in different learning contexts (Klímová, 2018; Koole, 2009; Stockwell & Hubbard, 2013; Yang, 2013). Notwithstanding these constraints, Burston's (2015) review of studies focused on MALL concludes that a significant 80% of them demonstrate that MALL fosters improvements in reading, listening, and speaking proficiency. A large body of prior literature on the effects of implementing MALL for EFL teaching and learning has shown positive outcomes in language skills (e.g., Çakmak & Erçetin, 2018; Moghari & Marandi, 2017; Shih et al., 2015). Moreover, recent studies have indicated how integrating game-

based learning platforms such as Kahoot! and Quizizz into EFL classrooms can ignite students' motivation for language learning (Anak Yunus & Hua, 2021; Degirmenci, 2021; Hou, 2018). The literature on these web-based applications and platforms serves as a valuable reference for this study to explore the types of technologies used in the EFL classrooms of Hong Kong.

While these digital applications and platforms are becoming ubiquitous in EFL classrooms, it is worth noting that using technology does not directly improve EFL learning outcomes. Reviews of the literature on CALL and MALL in EFL classrooms reveal that the evidence regarding the direct influence of technology on linguistic outcomes is limited and inconclusive (Abdu, 2018; Burston, 2015; Kamasak et al., 2021). The authors of these studies criticise the technology-centric view that attributes language gains purely to technology without considering the combined effects of factors such as learning feedback, learning content, and the influence of teachers on learning outcomes. Specifically, Abdu (2018) emphasised that technology per se is not a magic bullet for teaching or learning EFL, and its effectiveness depends on how it is handled in practice. This highlights the role of teachers in EFL classrooms as learners require proper guidance to proficiently employ mobile devices for language acquisition (Stockwell, 2014) and the importance of examining how technology is integrated into the content, pedagogy, and overall teaching plan.

Moreover, it is noteworthy that there often exist pedagogical issues concerning the mismatch between language learning activities and the appropriateness of the technological devices used. Stockwell (2014) notes that many CALL practitioners simply replicate activities using technology originally designed for pen and paper without taking advantage of the benefits of computers or mobile devices. Beatty (2010) states that finding a good fit between technology and pedagogy will continue to be challenging, highlighting the importance of leveraging the strengths of both teachers and technology to their fullest potential.

As the focus of research on CALL evolves from the investigation of the need for computers in classrooms and its effectiveness compared to traditional learning to teachers' preparedness for implementing CALL (Beatty, 2010; Tafazoli & Meihami, 2023), it is crucial to investigate whether teachers are equipped with sufficient knowledge to utilise CALL in their language classrooms. Since there is no one-size-fits-all approach to technology integration and efforts at technology integration should be customised to suit the distinct subject matter within particular classroom settings (Koehler & Mishra, 2009), this study looks into EFL teachers' readiness for technology integration in the Hong Kong context.

2.1.2 Technology Integration in Hong Kong EFL Classrooms

The advancement of ICTs has reshaped the goals of EFL education in the 21st century, with teachers expected to simultaneously improve students' digital literacy and English language proficiency to enable their active participation in an information-rich society (Park & Son, 2022).

Hong Kong Education Bureau (EDB) has encouraged teachers of all subjects to use ICT in the classrooms to achieve learning goals and foster students' 21st-century skills since its first strategy for Information Technology in Education (ITEd) in 1988 (EDB, 2014). To date, EDB has implemented four strategies:

1. The first ITEd strategy (1998–2002) centred on furnishing primary and secondary schools with computers and internet access and developing teachers' basic digital skills, which formed a solid foundation for teachers' use of technologies in classrooms (EDB, 2012).
2. The second ITEd strategy (2003–2006) was implemented to enhance teachers' capabilities in integrating ICT into teaching through the provision of professional development programmes (Education and Manpower Bureau [EMB], 2004). The goal of this strategy was to shift the educational paradigm from a predominantly teacher-centred approach to a more interactive and student-centred approach (EMB, 2004).
3. The third ITEd strategy (2007–2012), entitled *Right technology at the right time for the right task*, was based on the belief that learning outcomes depend on the appropriateness and effectiveness of the use of technology by teachers and students in their teaching and learning, rather than relying on any hardware or software applications. It emphasised the human factor over the technological environment for successful technology integration into teaching and learning (EDB, 2012).
4. The fourth ITEd strategy (2014–present) seeks to foster lifelong learning by enhancing students' 21st-century skills, such as self-directed learning, collaboration, and computational thinking abilities (EDB, 2014). This involves empowering teachers to develop various pedagogical approaches for their respective subject matters using ICT and leveraging their role as facilitators of students' use of technology.

These four strategies have yielded positive results in improving schools' ICT infrastructure and enhancing teachers' repertoire of teaching with the use of ICT. However, the paradigm shift to student-centred learning poses challenges for some teachers who do not have sufficient pedagogical knowledge of using ICT to improve teaching, highlighting the need for sustained support for technological capacity building and the professional development of teachers (EDB, 2015). Meanwhile, Law & Yuen (2010) point out that despite some changes in pedagogy, teaching innovations that integrate the use of ICTs remain rare and are not well-aligned with the use of ICT tools in specific subject areas. Thus, it is necessary to investigate how pre-service teachers in Hong Kong integrate ICT with EFL instruction and whether ICT is used to support student-centred pedagogy.

The continuing efforts of Hong Kong's educational authorities to encourage the use of ICT in schools have reaped some positive results. A report on the third ITEd strategy revealed that 69% of the teachers teaching English language education felt confident about using ICT for

teaching and learning (EDB, 2012). While this indicates that the majority of EFL in-service teachers in Hong Kong are confident in integrating technology into their teaching practices, scant attention is paid to EFL pre-service teachers' perceptions and experiences of teaching with technologies.

Hong Kong has also exerted endeavours to revise the EFL curriculum, aiming to equip students for subsequent academic pursuits, professional trajectories, and the socio-economic demands stemming from the progressions in ICT. For instance, the *English Language Education Key Learning Area Curriculum Guide* proposed by the Curriculum Development Council (CDC) stresses the significance of teachers' roles in equipping students with knowledge and skills to be able to interpret, use, and produce English materials in multimodal forms enabled by technologies (CDC, 2017). However, there is a lack of literature on whether current pre-service EFL teachers in Hong Kong have acquired the knowledge and skills to enable their future students to achieve these goals. This study explores the readiness of these teachers and the factors that influence their readiness for future technology integration.

2.2 Factors Influencing Pre-Service Teachers' Technology Integration

With the proliferation of ICT use in classrooms, studies on factors that influence technology integration have also increased (Bai et al., 2021). A broad spectrum of external and internal factors has been explored.

2.2.1 External Factors

Schools' infrastructure, budgets for technological resources, opportunities for professional development, and principals' and teacher educators' support have been identified as components external to teachers that affect technology integration (Ertmer, 1999; Ertmer, 2005; Harrell & Bynum, 2018; Petko et al., 2018). These factors are prevalent not only among pre-service teachers but among teachers in general. Specifically, Ertmer (1999) refers to poor infrastructure and inadequate technologies as first-order barriers to technology integration in teaching and learning. Petko et al. (2018) indicate that while previous studies have repeatedly shown that insufficient or outdated devices hinder their integration in teaching and learning, increased accessibility of devices does not necessarily translate to successful technology integration.

Similarly, Harrell and Bynum (2018) note that even with the availability of technological devices and tools in schools, offering teachers professional development opportunities centreing on technology use alone does not automatically result in increased technology integration in the classroom. They suggest that successful technology integration by teachers requires not only access to resources and training but also relevant knowledge and skill support during professional development programmes. Although many studies have confirmed that professional development positively affects teachers' technology integration, its impact is limited if only a one-time

workshop is offered (Scott & Mouza, 2007). Studies have shown that continued professional development (Blocher et al., 2011) or situational professional development, such as one-to-one coaching (Kopcha, 2012), can strengthen teachers' beliefs in the benefits of technology integration in the classroom and their confidence in using technology.

In addition, teacher educators, as role models for technology integration, can inspire pre-service teachers to use technology in their future classrooms (Kaufman, 2014; Tearle & Golder, 2008). However, Tonduer et al. (2016) argue that simply observing the use of technology by teacher educators is insufficient to improve pre-service teachers' ability to integrate technology. They emphasise the need for deliberation and contemplation on effective technology implementations to gain critical insights into the relationship between the purpose and application of specific technologies. In sum, previous studies suggest that the impact of computer availability, professional development, and the role of principals and teacher educators in technology integration is intricate yet important. Alongside these external factors, the following section introduces the internal factors and illustrates how they collectively shape the successful incorporation of technology in educational settings.

2.2.2 Internal Factors

Internal factors influencing pre-service teachers' technology integration include their beliefs (Ertmer, 2005; Ertmer, 2012; Hermans et al., 2008; Judson, 2006; Kim et al., 2013), attitudes (Cullen & Greene, 2011; Kadel, 2005; Farjon et al., 2019), and self-efficacy (Anderson et al., 2011; Hsu, 2010). Specifically, Ermter (2005) notes that to enhance teachers' effective use of technology in the classroom, it is essential to understand how their teaching practices are rooted in their pedagogical beliefs.

Two widely cited theoretical models, the Technology Acceptance Model (TAM) (Davis et al., 1989) and the Theory of Planned Behaviour (TPB) (Ajzen, 1991), have been applied in different contexts to investigate the relationship between beliefs, attitudes, and technology use. The TAM theorises that perceived usefulness and perceived ease of use, which are influenced by external variables, are two indicators of users' attitudes that affect their intention to use technology (Davis et al., 1989). Teo's (2009) application of TAM in education reveals that pre-service teachers' intention to utilise technology is directly impacted by perceived usefulness, computer use attitudes, and self-efficacy. In comparison, TPB posits that individuals' actual behaviours are determined by their behavioural intentions, which are influenced by their attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991). Research examining both TAM and TPB indicates that beliefs can contribute to teachers' intentions to use technology (Smarkola, 2008). This finding is supported by Teo (2012), who combines these two models and discovers that pre-service teachers' positive beliefs and attitudes toward technology use are critical factors in promoting their intention to integrate technology into their teaching. Empirical studies have also

confirmed that teachers who believe that technology is beneficial to students' learning and instructional goals are more likely to use technology in classrooms (Inan & Lowther, 2010; Miranda & Russell, 2012).

However, some scholars have observed an inconsistency between pre-service teachers' stated pedagogical beliefs and their actual application of technology in their teaching. For instance, Bate (2010) found that pre-service teachers' pedagogical beliefs that align with student-centred learning do not necessarily lead to practices that integrate pedagogical, content, and technological knowledge. Other factors, such as teachers' TPACK, schools' policies, and institutional constraints, contribute to the lack of technology use in classrooms. Hence, instead of utilising TAM or TPB, this study adopts Mishra and Koehler's TPACK model (see more detail in Section 2.3.2) as one of the theoretical frameworks, offering a more comprehensive perspective that incorporates teachers' TPACK as a vital indicator of their readiness for integrating technology into their future teaching practices.

Another key indicator of teachers' readiness is self-efficacy, which is defined as one's judgment of their capability to perform a given task (Bandura, 2006). Individuals with strong self-efficacy tend to invest significant effort to accomplish a task and are likely to persist in the face of challenging obstacles (Bandura, 1977). Studies have also shown that teachers with higher self-efficacy in technology integration are more likely to use technology for student-centred learning (Anderson et al., 2011; Chen, 2010).

There has been extensive research on pre-service teachers' self-efficacy in technology integration in various contexts, such as Korea (Lee & Lee, 2014), Indonesia (Lailiyah & Cahyono, 2017), Australia (Lemon & Garvis, 2016), and Turkey (Kaner & Aydin, 2021). However, while Bai et al. (2021) examined the self-efficacy of in-service teachers in Hong Kong regarding ICT use, much less is known about how pre-service teachers in Hong Kong perceive their ability to integrate technology into their teaching. This study aims to fill this gap by investigating their perceived self-efficacy and TPACK, which are essential factors in understanding pre-service teachers' readiness for technology integration and will be discussed in detail below.

2.3 Theoretical Framework

Pre-service teachers are expected to be open to using technology frequently and effectively in their teaching, as most recent and soon-to-be graduates have grown up with digital technologies (Gao et al., 2011). However, many studies have reported that pre-service teachers feel ill-prepared to effectively use ICTs in their teaching (Sang et al., 2010; Ranellucci et al., 2020). As noted in Section 2.2, to comprehensively examine pre-service teachers' readiness for technology integration, this study focuses on two key theoretical frameworks: the self-efficacy theory and the Technological Pedagogical Content Knowledge (TPACK) model.

2.3.1 Self-efficacy Theory

Self-efficacy is a concept developed from Bandura's (1977) social cognitive theory. This theory highlights that human behaviours should be understood within a triadic reciprocal causal relationship, where they influence and are influenced by both psychological factors and social structural factors (Bandura, 1997). While humans are influenced by their surroundings, they are not passive recipients but active participants. This theory emphasises human agency, which engages in proactive, rather than reactive, self-influence in response to the environment (Bandura, 1997). Bandura (1986, 1997) defines self-efficacy as people's belief in their ability to plan and carry out actions that result in a specific performance. Teachers' self-efficacy refers to the convictions that teachers hold regarding their capability to achieve desired results in student participation and academic progress (Tschannen-Moran & Hoy, 2001). Teachers' self-efficacy towards technology integration is generally perceived as their belief in their ability to effectively utilise technology for teaching and learning. According to Bandura (1997), there are four sources of self-efficacy, as detailed below.

2.3.1.1 Enactive Mastery Experiences

Enactive mastery experiences are regarded as the most potent wellspring of self-efficacy because they provide direct evidence of whether people have the ability to achieve their goals (Bandura, 1997). Successful experiences can boost people's self-efficacy while failures undermine it (Bandura, 1997). In terms of technology integration experiences, Sun et al. (2017) found that field experiences can increase pre-service teachers' readiness for technology integration by familiarising them with the technology used in schools and cultivating their situational understanding of utilising these technologies in their teaching practices.

2.3.1.2 Vicarious Experiences

Vicarious experiences are another source of information from which people can judge their capabilities based on the observation and comparison of other people in similar settings, such as peers, colleagues, and competitors (Bandura, 1997). Witnessing someone similar to oneself perform a task successfully increases the observer's self-efficacy to accomplish similar activities (Bandura, 1997). In the same vein, observing models of comparable competencies fail despite significant effort lowers observers' perceptions of their capabilities and undermines their motivation and expectations of their endeavours (Brown & Inouye, 1978). The higher the perceived similarity between the model and oneself, the greater the influence of the vicarious experience on the observer (Bandura, 1997). Wang et al.'s (2004) study of teachers' self-efficacy towards technology integration identifies a powerful effect of vicarious experience and goal establishment on teachers' successful technology integration. Specifically, they found that exposing pre-service teachers to exemplary technology-using teachers and providing them with

teaching goals increases their self-efficacy in effectively integrating technology in their classrooms.

2.3.1.3 Verbal Persuasion

Bandura (1997) suggests that verbal persuasion can increase people's belief that they are capable of achieving their desired goals. In situations where individuals are going through challenging times, this source can be particularly beneficial if others are providing encouragement and expressing belief in their capabilities (Bandura, 1997). Verbal persuasion is a valuable source of self-efficacy when people receive evaluative performance feedback from their coaches, colleagues, or principals (Barton & Dexter, 2020). Receiving feedback highlighting one's capabilities enhances self-efficacy and sustains their efforts to ultimately achieve a high level of competency (Bandura, 1997). When people are persuaded to believe that they have what it takes to succeed, they are more resilient and less likely to dwell on self-doubt when problems arise (Bandura, 1999). In an examination of teachers' self-efficacy for technology integration after professional learning, Barton and Dexter (2020) found that while verbal persuasion is helpful, it does not directly boost teachers' confidence compared to self-directed learning. Additionally, verbal persuasion did not direct teachers towards specific actions for technology use.

2.3.1.4 Physiological and Affective States

People also rely on their physiological and emotional states to judge their capabilities (Bandura, 1997, 1999). People see their psychological feelings, such as tension, anxiety, and depression, and their physical states, such as aches, pains, and fatigue, as indicators of vulnerability and impairment (Bandura, 1997). This suggests that to enhance one's self-efficacy, it is necessary to improve their mood and physical well-being, correct misinterpretations of bodily sensations, and decrease stress levels (Bandura, 1999). Atabek's (2020) examination of pre-service teachers' emotional states for using educational technologies reveals that while technical anxiety prompts teachers to enhance their ability to use technologies, it also makes it challenging for them to actually use technologies in classrooms. They also found that technical anxiety causes pre-service teachers to use technologies more for classroom management than instructional purposes.

In summary, while self-efficacy theory provides four sources of information on whether teachers have beliefs in their capabilities for technology integration, teachers' readiness to integrate technology into their future teaching practice is also inextricably linked to their technology competencies (Sun et al., 2017). The TPACK model provides a knowledge base for understanding whether teachers have sufficient knowledge and skills for effective technology integration, as will be discussed in the following subsection.

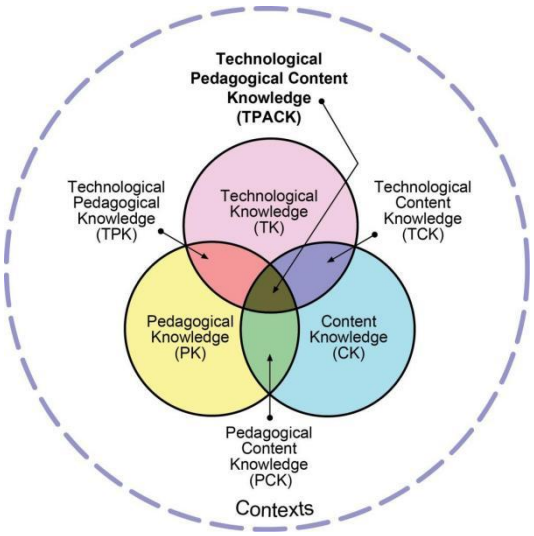
2.3.2 TPACK Model

The TPACK model is built on Schulman's (1986) construct of pedagogical content knowledge (PCK), which states that teachers' knowledge of content and pedagogy cannot be considered separately. Mishra and Koehler (2006) expanded PCK into TPACK by adding technological knowledge to provide a teacher knowledge framework for technology integration (see Figure 2.1). This model explains how the interaction between teachers' understanding of technology and PCK affects their use of technology in classrooms. It emphasises examining the connection among technology, content, and pedagogy in a more ecological way rather than treating technology as an add-on to teaching practices (Koehler, Mishra, & Cain, 2013).

The TPACK model outlines seven types of knowledge that teachers need to develop to successfully teach with technologies, including three main components of technological knowledge (TK), content knowledge (CK), and pedagogical knowledge (PK), and their intersections (see Figure 1). By developing knowledge in these areas, teachers can create learning experiences that leverage technology in meaningful and effective ways to meet specific content learning and pedagogical goals.

Figure 2.1

The TPACK Framework



Note. From "Using the TPACK Image" by M. Koehler & P. Mishra, 2012 (http://tpack.org/). Copyright 2012 by tpack.org. Reprinted with permission.

Definitions of the seven types of the TPACK model (Koehler et al., 2013) and TPACK in EFL will be discussed as follows:

1. Content knowledge is teachers' knowledge about the subject matter they teach, which varies according to the grade levels.

2. Pedagogical knowledge is teachers' knowledge about the processes, methods, and strategies for teaching the subject matter. It involves multiple aspects of the EFL teaching and learning process such as classroom management, students' learning motivation, and lesson plans.
3. Technological knowledge refers to a teacher's understanding of using hardware, software, and other technologies effectively in an educational setting. This includes knowledge of how to operate and troubleshoot devices, as well as the ability to adapt and learn new technologies due to the dynamic nature of the field. For EFL teachers, mastering TK is crucial as they need to use audio-visual resources to create an immersive English environment in order to improve their students' English proficiency (Liu et al., 2014).
4. Technological content knowledge (TCK) describes a teacher's understanding of how technology and content interact and influence each other in teaching and learning. Teachers with TCK understand how the affordances of certain technologies can affect the presentation and delivery of content. They also understand how the content can influence which technologies are most appropriate for effective teaching. EFL teachers with TCK are capable of selecting instructional content using available technologies while effectively leveraging the technological tools to optimise content delivery.
5. Pedagogical content knowledge (PCK) is a teacher's understanding of how to teach a particular content area effectively. This includes knowledge of the content and the methods and strategies best suited for teaching that content to students.
6. Technological pedagogical knowledge (TPK) recognises "the reciprocal relationship between technology and pedagogy" (Koehler et al., 2013, p. 4) and that effective integration of technology requires a deep understanding of both. EFL teachers with TPK can identify and select appropriate technologies to achieve specific pedagogical goals while also developing new pedagogical approaches that leverage the affordances of the technologies at hand.
7. Technological pedagogical content knowledge (TPACK) represents a synthesis of all the above-mentioned types of knowledge. It focuses on how technology can be used to meet pedagogical needs and enhance the teaching of specific content in specific contexts. EFL teachers with TPACK have the ability to synthesise their knowledge of technology, content, and pedagogy to design engaging and effective learning experiences for their students.

Overall, the TPACK model highlights the complexity of teaching and the necessity for teachers to be equipped with all types of knowledge to achieve effective teaching with technology. It provides a comprehensive framework for teachers to understand the complex interplay between technology, pedagogy, and content and to make informed decisions about integrating technology

to enhance student learning (Koehler et al., 2013). It also serves as a theoretical lens to measure pre-service teachers' readiness for technology integration (Koehler et al., 2013).

2.4 Research Questions

The review of the prior literature shows the vital role of teachers in technology integration for EFL teaching and learning. The need to understand EFL teachers' readiness for integrating technology into their future practices calls for examining their self-efficacy, TPACK, and experiences in teaching EFL with technologies. To date, only one study has examined EFL pre-service teachers' readiness for technology integration in the Hong Kong context (Moonyoung & Jeong, 2022). With increasing investments in education and technology, the widespread implementation of ICTs, and the emphasis on building digital classrooms for student-centred learning in Hong Kong (Kong et al., 2014), assessing whether pre-service teachers are ready to use technologies in their teaching effectively is imperative. This study aims to fill this research gap by examining the self-efficacy, TPACK, and experiences of EFL pre-service teachers in technology integration and providing recommendations for teacher education programmes to better equip future teachers with the training and knowledge needed to integrate technology effectively in EFL teaching. The following research questions will guide this study:

1. What are EFL pre-service teachers' perceived levels of self-efficacy and TPACK in integrating technology into their teaching practices?
2. What prior training and experiences influence EFL pre-service teachers' self-efficacy and TPACK?
3. How do prior training and the experiences of EFL pre-service teachers explain their reported level of self-efficacy and TPACK?

Chapter 3: Methodology

This chapter begins with an introduction to the research design and how it aligns with the research questions. Secondly, it describes the participants in the Hong Kong context and the sampling procedure. Thirdly, it outlines the research instruments of this study. Fourthly, it discusses data analysis, ethical considerations, and the limitations of this study.

3.1 Research Design

3.1.1 Rationale for Adopting A Mixed Methods Approach

This study aims to investigate the readiness of Hong Kong EFL pre-service teachers to integrate technology into their future teaching practices. Given that teachers' readiness is a multifaceted issue influenced by their perceived self-efficacy, knowledge, and experiences, a single method would be insufficient to gain a thorough understanding of this phenomenon. While employing quantitative methods for data collection, such as questionnaires allows for the measurement of teachers' readiness for technology integration (see Misieng et al., 2018), it restricts the exploration of their lived experiences that shape their readiness. In the same vein, relying exclusively on qualitative methods would not equip me with knowledge of the frequency of participants' varying readiness levels or quantitative information regarding the levels of agreement or disagreement with the survey statements among respondents (Choy, 2014). Therefore, a mixed methods approach was employed, as it allows researchers to explore a complex phenomenon using a combination of quantitative and qualitative methods that offset the strengths and weaknesses of both (Plano & Ivankova, 2016).

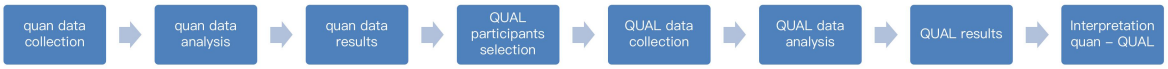
Moreover, mixed methods research facilitates the "breadth and depth of understanding and corroboration" (Johnson et al., 2007, p. 123). Theoretically, the breadth and generalisability of the research can be enhanced by administering questionnaires to a larger population (Polit & Beck, 2010). In my study, an online questionnaire was utilised for the collection of quantitative data, aiming to reach a broader population and obtain a generalised understanding of pre-service teachers' readiness for integrating technology (Cohen et al., 2017). Meanwhile, interviews were conducted to enrich the analysis by providing insights into participants' training and teaching experiences and how these experiences have equipped them with the necessary knowledge and skills for effectively integrating technology into their future teaching practices. However, it should be noted that the findings of this study cannot be extrapolated to the broader population of pre-service teachers across different countries due to practical constraints such as limitations in time and resources, which will be elaborated upon in Section 3.6.

3.1.2 Sequential Explanatory Design

The study adopted a sequential explanatory design to align with the research questions that encompass quantitative, qualitative, and mixed methods inquiries (Tashakkori & Creswell, 2007). The explanatory design involves two phases of data collection and analysis (Creswell et al., 2003). In this design, the research starts with the collection and analysis of quantitative data, followed by the collection and analysis of qualitative data to expand and explain the quantitative results (Creswell & Plano Clark, 2018). Specifically, this study followed a participant selection model of explanatory design as shown in Figure 3.1 (Creswell & Plano Clark, 2007).

Figure 3.1

The Participant Selection Model of Explanatory Design



Note. From *Designing and Conducting Mixed Methods Research* (1st ed.) (p. 73), by J. W. Creswell and V. L. Plano Clark, 2007, Sage. Copyright 2007 by Sage.

In the quantitative phase of my study, data were collected to gain a general understanding of the research problem (Ivankova et al., 2006). Guided by the quantitative research question: *What are EFL pre-service teachers' perceived levels of self-efficacy and TPACK in integrating technology into their teaching practices?*, this phase involved administering an online questionnaire to EFL pre-service teachers in two Hong Kong universities to gain an overview of their readiness for technology integration. Based on the results of teachers' varying levels of readiness for technology integration, a sub-sample of participants was purposefully selected to participate in the second phase (Creswell & Creswell, 2022), where they were invited to a semi-structured interview to discuss their questionnaire responses. Informed by the second research question: *What prior training and experiences influence the self-efficacy and TPACK of EFL pre-service teachers?*, this qualitative phase aimed to explain the quantitative results in more detail (Creswell & Creswell, 2022). While this study began with collecting quantitative data, it placed more emphasis on qualitative data as valuable sources of information to understand how pre-service teachers' teaching experiences and training explain their readiness for technology integration and the influencing factors. Integration of this design took place after the qualitative phase by "arraying the quantitative results with the qualitative data collection" (Creswell & Creswell, 2022, p. 612). The integration phase addressed the final research question: *How do prior training and the experiences of EFL pre-service teachers explain their reported level of self-efficacy and TPACK?*

3.2 Participants and Sampling

3.2.1 Description of Participants

The participants targeted for this study were pre-service teachers currently enrolled in five-year undergraduate EFL teaching degree programmes at two universities in Hong Kong. These universities were selected based on their specialised faculties and departments dedicated to the preparation of future EFL teachers. Additionally, both universities have earned renowned reputations for their education and teacher training programmes, as well as their extensive digital resources for EFL teaching and training. It was worth noting that both universities rank among the top eight public universities in Hong Kong, with one being the only government-funded teacher-training university in Hong Kong and the other offering a robust and comparable teacher-training curriculum. These factors render them suitable options for researching the readiness of pre-service English teachers in Hong Kong for technology integration in their prospective classrooms.

One of the universities (hereafter referred to as University A) provides both a single bachelor's degree in English language and a double bachelor's degree in language studies and English language. The other university (hereafter referred to as University B) offers a double degree in BA (English Language and Literature) and BEd. Both universities have similar curricula and require students to gain teaching experience at local schools during their third to fifth years of study. Upon successful completion of these programmes, graduates are exempt from the Language Proficiency Assessment for Teaching (LPAT), a requirement to become qualified in-service EFL teachers in Hong Kong.

3.2.2 Sequential Mixed Methods Sampling

Consistent with the research design, this study employed a sequential mixed methods sampling approach (Teddlie & Tashakkori, 2009). Specifically, the quantitative sample was used as the sampling frame for the qualitative sample (Teddlie & Yu, 2007). Given the study's focus on the influence of EFL pre-service teachers' training and teaching experiences on their readiness for technology integration, the criteria for selecting survey and interview participants included being above 18 years old, pursuing an EFL teaching-related bachelor's degree, and having at least two weeks experience of teaching practicum in Hong Kong local primary or secondary schools.

To identify eligible participants, two students from each university were approached through personal networks to distribute the online questionnaire link within the WeChat and WhatsApp groups encompassing their respective cohorts. This ensured the inclusion of all year five students in University A and all year four students in University B. Additionally, snowball sampling was employed to expand the sample size by targeting students in their third to fifth years at these two universities who had completed at least two weeks of teaching experience in local schools. The potential bias associated with snowball sampling was acknowledged (Cohen et al., 2017). To

minimise this, I contacted programme leaders and teaching faculty members at both universities via email, seeking their assistance in disseminating the online questionnaire to their students. Unfortunately, no responses were received from them.

Participants for the qualitative phase came from a sub-sample of the quantitative sample who responded to the online questionnaire. Stratified purposive sampling (Creswell & Creswell, 2022) was adopted to divide the sub-samples into low, medium, and high-readiness groups based on respondents' self-reported levels of self-efficacy and TPACK. This approach enables researchers to identify and provide a detailed description of similarities and differences among the various strata (Creswell & Creswell, 2022). Therefore, I was able to compare the influencing factors behind pre-service teachers' varying readiness for technology integration.

3.3 Research Instruments

Embracing methodological pragmatism, this study recognises that there are multiple realities and distances itself from the dichotomy between postpositivism and constructivism (Tashakkori & Teddlie, 2003). The pluralistic perspective embedded in pragmatism guides the researcher to "collect data by 'what works' to address the research questions" (Creswell & Plano Clark, 2011, p. 42). This study used two instruments to collect data to address the research questions, including an online questionnaire and virtual interviews with EFL pre-service teachers in Hong Kong.

3.3.1 Online Questionnaire

A closed-ended online questionnaire was administered to eligible EFL pre-service teachers from both universities to collect quantitative data. The utilisation of an online questionnaire in this study was driven by the advantages offered by the digital format in addressing spatial and temporal limitations and facilitating the collection of a larger volume of data (Cohen et al., 2017). The questionnaire consisted of three sections (see Appendix A). The first section gathered demographic information, participants' majors and school levels, and their use of technology during their teaching practicum. The second and third sections comprised two previously validated survey instruments to assess the readiness of pre-service EFL teachers for technology integration: the Computer Technology Integration Survey (CTIS) developed by Wang et al. (2004) and the TPACK-EFL survey by Baser et al. (2016). The decision to use existing surveys in this study was based on their extensive testing and validation by previous researchers in the field. Both surveys employed a five-point Likert-type scale, with response options spanning from strongly agree to strongly disagree.

The CTIS, which underwent content and construct validity reviews by Wang and her colleagues (2004), measured participants' perceived self-efficacy levels in technology integration. The original CTIS consisted of 21 items assessing participants' confidence in using technology, all of which began with "I feel confident that…" (see Appendix A). A factor analysis was

conducted by Wang and her colleagues (2004), resulting in a two-factor solution that accounted for 55.36% of the systematic covariance among the items. Given the focus of this study on pre-service teachers' confidence in technology use, the main factor (eigenvalue = 9.85) that included 16 items assessing participants' perceptions of their computer technology capabilities and strategies was used for this study (Wang et al., 2004). Based on pre- and post-survey data, Cronbach's alpha coefficients of 0.94 and 0.96 indicated this 16-item scale had a high level of internal consistency (Wang et al., 2004). Additionally, the construct validity of the 16-item scale was confirmed through another factor analysis, demonstrating its validity as a single measurement instrument (Wang et al., 2004).

Although there are several established surveys for assessing pre-service teachers' TPACK, the TPACK-EFL survey developed by Baser et al. (2016) was chosen as the instrument for this study as it specifically focused on evaluating EFL pre-service teachers' TPACK. According to Baser et al. (2016), this subject-specific survey was developed following Creswell and Plano Clark's (2007) model for instrument development, aiming to enhance the internal and external validity of the survey items. To ensure the content validity of the survey, Baser et al. (2016) invited a panel of experts in foreign languages, pedagogy, and instructional technology to review the survey items. The original survey consisted of 39 items organised into seven factors based on the TPACK framework. For this study, a subset of 23 items related to technological knowledge was selected from this instrument. This subset included 9 items for Technological Knowledge (TK), 3 items for Technological Pedagogical Knowledge (TPK), 7 items for Technological Content Knowledge (TCK), and 4 items for TPACK. According to Baser et al. (2016), the reliability of these four sub-scales was assessed using Cronbach's alpha, resulting in coefficients of all sub-scales higher than 0.80. These high values indicate a strong level of internal consistency and reliability for the items within each construct.

Following a recruitment period spanning three weeks, this study collected a total of 40 responses. All participants were invited to participate in a follow-up interview and asked to provide their contact numbers upon completing the questionnaire if they were interested in further involvement. A total of 10 participants volunteered for the interviews, including two from the low-readiness group, five from the medium-readiness group, and three from the high-readiness group.

3.3.2 Semi-structured Interviews

Semi-structured interviews are helpful in mixed methods research as they extend probing and add depth to the quantitative approach (Adams, 2015). Since the interview protocol refinement (IPR) framework is deemed most suitable for refining semi-structured interviews (Castillo-Montoya, 2016), I followed this framework to strengthen the reliability of my interview protocol (see Appendix B). According to Castillo-Montoya (2016), IPR entails consistency between

interview questions and research questions. Drawing on Bandura's (1997) self-efficacy theory and Mishra and Koehler's (2006) TPACK framework, I developed an interview protocol to address the second research question: *What prior training and experiences influence the self-efficacy and TPACK of EFL pre-service teachers?*

The first section of the interview protocol was developed following Bandura's (1997) four sources of self-efficacy (see detailed explanation in Section 2.3.1). Considering that conducting interviews in the participant's native language facilitates effective communication and rapport-building (Welch & Piekkari, 2006), and all participants were Chinese, the interviews were primarily conducted in Mandarin, with English being used only when discussing specific web tools or applications for teaching English. Following IPR (Castillo-Montoya, 2016), I sought feedback on the interview protocol from my supervisor and did one pilot interview to refine the protocol. The refined Chinese interview protocol was translated into English for subsequent data analysis and is provided in Table 3.1.

Table 3.1

Interview Protocol Related to Self-efficacy

Item	Interview Protocol (Chinese-English Translated Version)	Sources of Self-efficacy
1	Can you elaborate on what digital technologies and tools you employed during your teaching placement and how you learned to become proficient in using them?	Mastery experiences
2	In what ways has your previous experience teaching EFL with technology influenced your confidence in integrating technology into your future classes?	Mastery experiences
3	How have the successes or failures of your peers' experiences with digital technologies or tools impacted your confidence in integrating technology into your EFL class?	Vicarious experiences
4	How have other people encouraged you to use digital technologies or tools in your EFL class?	Verbal persuasion
5	How have your students' responses to the use of digital technologies or tools for EFL teaching affected your confidence in integrating technology into your class?	Verbal persuasion or physiological and affective states

6	What were your physiological and affective states when you integrated digital technologies and tools into your EFL class?	Physiological and affective states
7	What challenges, if any, have you faced when incorporating digital technologies or tools into your EFL teaching?	Questions that may be relevant to any of the four sources of self-efficacy

The second section of the interview protocol was designed based on Mishra and Koehler's (2006) TPACK framework (see Table 3.2).

Table 3.2

Interview Protocol Related to TPACK

Item	Interview Protocol (Chinese-English Translated Version)	TPACK
1	How do you determine which digital technologies or tools are suitable for EFL teaching?	TK
2	If applicable, how do you utilise technology to develop new teaching methods? Could you elaborate on your approach?	TPK
3	Could you provide a specific example of how you use a particular digital software or tool to accomplish teaching objectives?	TCK
4	How do you perceive the relationship between the digital tools and technologies you use and the content of your teaching (listening, speaking, reading, and writing) and teaching methods?	TPACK
5	In comparison to traditional classroom teaching, what do you believe are the advantages and disadvantages of incorporating digital technology and tools in achieving EFL teaching goals?	Questions that may be relevant to any of the TPACK components

To conduct an "inquiry-based conversation" (Castillo-Montoya, 2016, p. 812) and ensure the flow of interviews, the final sequence of interviews was organised based on the structure of describing technology usage, the relationship between technology, content, and pedagogy, and reflections on factors influencing confidence in technology use (see Appendix B). To enhance EFL teacher education programmes in preparing future EFL pre-service teachers, participants

were asked to provide their suggestions regarding the curriculum design, teaching practicum, and instructional approaches within their respective programmes.

3.4 Data Analysis

Following the sequential mixed methods design, this research implemented a sequential analysis, with qualitative data analysis following the quantitative data analysis. This analytical approach involved an initial categorisation of individuals based on the quantitative data, followed by a comparison of these groups using subsequently collected qualitative data (Tashakkori & Teddlie, 1998). To establish connections and gain a comprehensive understanding, the quantitative and qualitative data were synthesised.

3.4.1 Quantitative Data Analysis

The quantitative data collected through the online questionnaire were analysed using descriptive statistics (Thompson, 2009). The first section of the questionnaire, encompassing demographic and school-related information, was analysed using percentages to provide a portrayal of the sample characteristics. Participants' responses to the subsequent sections on their self-efficacy level and TPACK, underwent descriptive analysis. Participants were categorised into low, medium, and high-readiness groups based on the total score obtained from a questionnaire of 39 items. The categorisation was determined using standard deviations, where data above the mean plus a multiple of the threshold standard deviation were classified as the high-readiness group, data below the mean minus a multiple of the threshold standard deviation were classified as the low-readiness group, and data falling between were classified as the medium-readiness group.

3.4.2 Qualitative Data Analysis

The qualitative data for this study comprised 10 online interviews, which were analysed using reflexive thematic analysis (RTA) (Braun & Clarke, 2019; 2021a). The selection of RTA over alternative methods was based on its fitness for the study's objectives. Reflexive thematic analysis's emphasis on contextualised, situated understanding of meaning and meaning-making, as opposed to the pursuit of objective truth, aligned with the research aim of exploring the diverse teaching experiences of pre-service teachers within the socio-cultural contexts of Hong Kong. Furthermore, I chose RTA because it fits into the pragmatic paradigm of my research. RTA affords researchers the flexibility to adopt different coding orientations, such as deductive or inductive coding, and coding focuses, such as semantic or latent coding (Braun & Clarke, 2019).

Using RTA enabled me to employ a hybrid deductive and inductive approach to analyse the interview data, thus capturing the richness of participants' accounts regarding their teaching experiences in local schools. During the deductive coding process, the initial codes used were

derived from four sources of self-efficacy (Bandura, 1997), which also guided the development of the questionnaires and interview questions. Additionally, inductive coding was employed to systematically analyse the data from the bottom up, allowing for the inclusion of other codes that developed through the researchers' subjective interpretation and reflective engagement with the data (Braun & Clarke, 2019).

Taking an experiential approach to data interpretation (Byrne, 2022), this study highlighted the significance of participant-derived meaning and meaningfulness as focal points of analysis. In line with the experiential orientation, careful attention was given to participants' accounts of their opinions and attitudes towards their own experiences (Byrne, 2022). Specifically, this study followed the six phases of the RTA (Braun & Clarke, 2006; Braun et al., 2019) to explore the training and experiences of EFL pre-service teachers that influence their self-reported readiness for technology integration. The visual analysis process can be seen in Figure 3.2.

Figure 3.2

Six Phrases of Thematic Analysis (Braun et al., 2019, pp. 852–957)



The first phase involved familiarising myself with the data, wherein I relistened to the interview audio recordings and immersed myself in the interview transcripts. In the second phase, I coded the data both semantically and latently after a more detailed engagement with the data so that both the meanings conveyed by the participants and the meanings I interpreted as the researcher were captured in the final themes (Byrne, 2022). These data-driven codes were then compared with the initial theory-driven codes before developing into themes. The third phase entailed searching for themes, which were developed through an "intersection of data, research experience and subjectivity, and research questions" (Braun et al., 2019, p. 854). In this phase, both theory-driven and data-driven codes were used as building blocks and analysed across 10 transcripts to construct candidate themes. Moving to the fourth phase, I carefully reviewed all candidate themes by revisiting the compiled extracts associated with each theme. An initial thematic map was created and scrutinised to assess its compatibility with the entire dataset. The fifth phase involved refining the initial themes, ensuring clarity, and avoiding any instances of "analytic 'thinness' or conceptual overlap" (Braun et al., 2019, p. 855) by providing explicit definitions for each theme. Lastly, the final phase encompassed the write-up of a reflexive thematic analysis, aiming to present a coherent narrative that captures the meaning of the data set and provides answers to the research questions. It is noteworthy that although the presentation of these six phrases followed a linear structure, the actual data analysis process was iterative,

involving a dynamic back-and-forth movement between datasets and generating themes when deemed necessary (Braun & Clarke, 2021b).

3.4.3 Mixed Analysis of Quantitative and Qualitative Results

Following the qualitative analysis, the quantitative and qualitative findings were combined during the discussion of the overall study outcomes and the derivation of implications (see Section 4.3) (Ivankova et al., 2006). This phase addresses the third research question: *How do prior training and the experiences of EFL pre-service teachers explain their reported level of self-efficacy and TPACK?* Mixing quantitative and qualitative results in this study is for 'significance enhancement', using qualitative interview data to enrich the interpretation of the quantitative results (Collins et al., 2006). In the mixed phase of this study, three different levels of readiness for technology integration are analysed in connection with qualitative results to elucidate how participants' training and teaching experiences explained their reported self-efficacy and TPACK. Comparisons between varying readiness levels and participants' interview extracts will be presented in Chapter 4 (see Table 4.5).

3.5 Ethical Considerations

This study has obtained ethical approval from Oxford's Central University Research Ethics Committee (CUREC) (see Appendix C). This study followed the University's CUREC best practice guidance (BPG) documents, which include BPG 06 on Internet-mediated research, BPG 09 on data collection, protection, and management, and BPG 05 on payments and incentives in research (see further discussion below). These guidelines offer comprehensive guidance on addressing ethical concerns in obtaining informed consent for online surveys and interviews, ensuring the confidentiality and security of online data, and giving appropriate incentives to the participants.

Securing informed consent from research participants is a core ethical practice in research (Wiles et al., 2007). For online surveys, participants were provided with comprehensive information about my research at the outset of the questionnaire. Those who met the inclusion criteria and willingly agreed to participate indicated their consent by checking the boxes before responding to the questionnaire (see Appendix A). A detailed information sheet (see Appendix D) and consent form (see Appendix E) outlining the purpose of the study, interview procedures, data protection, and methods of administration were provided to those who volunteered to participate in the interviews. Participants were informed of their autonomy to decline participation and withdraw from the study without any adverse consequences.

To ensure data confidentiality and safeguard against unauthorised access, this study collected data through Microsoft Forms and Microsoft Teams, online platforms that have been approved by the University of Oxford Information Security Department. All collected surveys, transcripts, and

audio recordings were stored in password-protected files during the research, ensuring a secure environment for data storage.

To facilitate the research process and acknowledge participants' contributions to the research outcomes, financial incentives were provided to participants who completed both online questionnaires and interviews. These incentives were offered as a token of gratitude for their participation, with the utmost care given to avoid any harm to the participants' well-being (Zutlevics, 2016). The provision of payment does not override the principles of informed consent and voluntary participation. Each participant was given 40 Hong Kong dollars (equivalent to around 4 pounds) through electronic transfer. The specific amounts and methods of incentives offered to participants were aligned with local practices within the context of Hong Kong.

3.6 Limitations

One potential weakness of this study was the restricted generalisability of the findings. This is due to the limited contact with other universities in Hong Kong and the lack of response from programme directors and faculty members at these institutions when seeking their assistance in reaching students. As a result, the surveys and interviews were conducted at two universities where personal connections were available. This limitation also pertains to the sampling methods employed in this study. While pre-service teachers in their fifth year at University A and fourth-year students at University B were directly informed about the research, other participants were recruited through snowball sampling. This sampling technique may introduce biases due to the influence of initial contacts (Cohen et al., 2017) and potentially leave some eligible participants unaware of the study.

However, I conducted in-depth interviews with pre-service teachers from various readiness groups, allowing for valuable insights into how their training and teaching experiences contribute to variations in their levels of readiness. Through thorough scrutiny and rigorous analysis, this study achieved analytic generalisation and developed "conceptualisations of processes and human experiences" (Polit & Beck, 2010, p. 1453). A qualitative thematic map was created (see Figure 4.2), representing information that is relevant to either the majority or all of the participants (Ayres et al., 2003). The interviewees further corroborated the attainment of analytic generalisation by expressing that their responses could, to some extent, represent the experiences of other pre-service EFL teachers in Hong Kong. This assertion is grounded in the similarity of curriculum designs across their respective programmes and the shared teaching experiences in comparable schools during their teaching practicums.

That said, the results may not be reproducible across a wider range of Hong Kong universities, as the studied universities represent the higher level and quality of educational teacher training programmes for EFL teachers. Ideally, a more comprehensive understanding of the readiness of pre-service EFL teachers to integrate technology into future EFL teaching in

Hong Kong would require samples from universities at different levels using methods such as random stratified sampling or cluster sampling (Cohen et al., 2017).

3.7 Chapter Summary

This chapter elaborated on the sequential mix-methods explanatory design of this research, detailing how it aligned with the research questions. Additionally, it presents the characteristics of the participants and provides a contextual understanding of the programmes that cultivate EFL pre-service teachers in Hong Kong. Then, this chapter explains the rationale for choosing the sequential sampling method and analyses how it facilitated the identification of participants for the qualitative segment of this study. Moreover, this chapter justifies the selection of online surveys and interviews as the research instruments for this study. Furthermore, it discusses the ethical issues involved throughout the research process and acknowledges the limitations of this study. Moving forward, the subsequent chapter will delve into the findings and discussions of this mixed methods research.

Chapter 4 Findings and Discussion

Following the sequential explanatory mixed methods research design, the chapter first presents the findings obtained from the online questionnaire, which outlines the profiles of the participants and their levels of readiness for integrating technology into their future classrooms. Building upon the categorisation of participants into three readiness groups, the following section of this chapter delves into the interviews conducted to examine the influence of participants' experiences and training on their preparedness for technology integration. Lastly, the chapter addresses the mixed research question by employing qualitative findings to elucidate participants' self-reported levels of readiness.

4.1 Quantitative Results

The quantitative phase addresses the first research question: *What are EFL pre-service teachers' perceived levels of self-efficacy and TPACK in integrating technology into their teaching practices?* This question was answered through the total score of the responses to the Computer Technology Integration Survey (CTIS) (Wang et al., 2004) and the TPACK-EFL Survey (Baser et al., 2016). A total of 40 responses were collected from two universities in Hong Kong, with 32 participants from University A and 8 from University B. The collected data was analysed using Microsoft Excel. This section provides descriptive statistics derived from the questionnaire.

4.1.1 A Profile of the Participants

Although EFL pre-service teachers from University A and B followed a similar curriculum, their teaching experiences in local schools varied based on their specific programme pathways. The participants from University A were enrolled in different pathways (see Table 4.1). The pathway focus of University A determined the school levels of teaching practicums for single-degree students and influenced the length of teaching practicums for double-degree students. Specifically, single-degree students with a primary focus exclusively taught in primary schools, while double-degree students with a primary focus spent more time teaching in primary schools than in secondary schools. Both single-degree and double-degree students were required to complete 22 weeks of teaching in local schools. In comparison, participants from University B were pursuing a double degree in BA (English Language and Literature) and BEd and were required to complete eight weeks of teaching practicums in both primary and secondary schools. The assignment of teachers to secondary and/or primary schools influenced how they interpreted their experiences of integrating technology into EFL instruction, as evident from feedback received from students at both levels. Further details on this topic will be provided in Section 4.2.1.

At the time of the questionnaire response, all participants had accumulated a minimum of eight weeks of teaching experience in local primary schools (40%), secondary schools (25%), or both (35%), within Hong Kong. In terms of gender distribution, the majority of participants were women (77.5%). A detailed profile of the participants is summarised in Table 4.1.

Table 4.1

A Profile of EFL Pre-service Teachers (n = 40)

Variables	Frequencies	Percentages
Degree Year		
Year three	9	22.5%
Year four	11	27.5%
Year five	20	50%
Major		
BEd (English Language) - Primary focus	11	27.5%
BEd (English Language) - Secondary focus	8	20%
BA (Language Studies) & BEd (English Language) - Primary focus	5	12.5%
BA (Language Studies) & BEd (English Language) - Secondary focus	8	20%
BA (English Language and Literature) & BEd	8	20%
School Level During Teaching Practicum		
Primary	16	40%
Secondary	10	25%
Both Primary and Secondary	14	35%
Gender		
Women	31	77.5%
Man	9	22.5%
Non-binary	0	0%
Prefer not to say	0	0%

Seven types of technologies were included in the questionnaire, following Inan and Lowther's (2010) categorisation of technologies in classrooms, which encompassed standalone learning tools, instructional preparation tools, and instructional delivery tools. The frequencies of

technology usage have been compiled in Table 4.2. These findings revealed that the most commonly employed technology was hardware, such as computers and laptops, which accounted for 90% of usage. Additionally, over half of the participants reported using Microsoft and Google applications (85%), interactive or game-based learning platforms (83%), learning management systems (83%), and discussion platforms (65%). A few of them used E-book platforms (40%) and social media applications (20%). All of the participants used at least one type of technology, as summarised in Table 4.2.

Table 4.2

Types of Technology Used During Teaching Practicum (n =40)

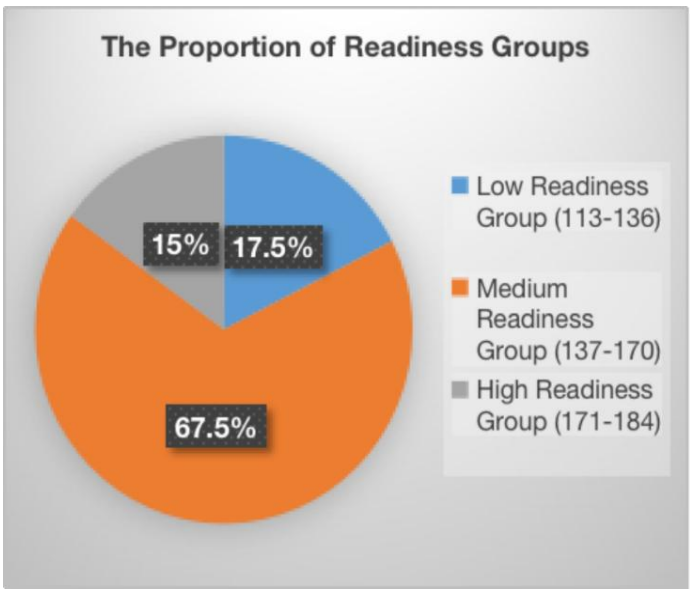
Variables	Frequencies	Percentages	Categories
Types of Technology Used During Teaching Practicum			
Hardware (e.g., computers, laptops, handhelds, whiteboards, etc.)	36	90%	Instructional preparation & delivery
Microsoft and Google applications (e.g., Word, PowerPoint, Google Docs, etc.)	34	85%	Instructional preparation & delivery
Interactive or game-based learning platforms (e.g., Kahoot!, NearPod, etc.)	33	83%	Standalone learning tools
Learning management systems (e.g., Canvas, Moodle, etc.)	33	83%	Instructional preparation & delivery
Discussion platforms (e.g., Padlet, Word Cloud, etc.)	26	65%	Instructional delivery
E-book platform (e.g., book creator, etc.)	16	40%	Standalone learning tools
Social media applications (e.g., Whatsapp, Facebook, Instagram, etc.)	8	20%	Instructional preparation
I have never used any of them	0	0%	
Other	0	0%	

4.1.2 Participants' Readiness Levels for Technology Integration

The participants' readiness for technology integration was measured by the combined scores of 16 items from the CTIS (Wang et al., 2004) and 23 items from the TPACK-EFL Survey (Baser et al., 2016). A five-point Likert-style scale was employed, with the following response options: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree. The participants' readiness levels, indicated by their total scores, were divided into three groups using the overall mean (M = 153.12) plus or minus one standard deviation (SD = 17.61): the low-readiness group (scores ranging from 113 to 136), the medium-readiness group (scores ranging from 137 to 170), and the high-readiness group (scores ranging from 171 to 184). The distribution of participants in these groups was as follows: 17.5% in the low-readiness group, 67.5% in the medium-readiness group, and 15% in the high-readiness group. These findings suggest that most EFL pre-service teachers likely possess a moderate level of readiness for integrating technology (see Figure 4.1).

Figure 4.1

The Proportion of Three Readiness Groups



4.1.3 An Analysis of Survey Results

This dissertation presents a ranking scale (see Appendix F) that arranges the statements concerning TPACK and self-efficacy in descending order based on participants' mean scores, thereby indicating their level of agreement with each statement. The average mean score of the 39 survey statements was 3.93, with the lowest mean score above 3.00 (suggesting a neutral stance) on a five-point Likert scale. This indicates that participants generally displayed a positive level of self-efficacy and TPACK in technology integration. The ensuing analysis will directly excerpt the

statements from Wang et al.'s (2004) self-efficacy survey and Baser et al.'s (2016) TPACK-EFL survey to examine the results.

Above all, participants demonstrated a good grasp of TK. For instance, statement 22: "I can use Office programs (i.e., Word, PowerPoint, etc.) with a high level of proficiency" received the highest mean score of 4.33. Their proficiency in utilising classroom equipment and multimedia resources was evident in statement 21: "I can use digital classroom equipment such as projectors and smart boards", which obtained a mean score of 4.28. Meanwhile, participants exhibited skill and confidence in using technology for EFL instruction. This was evidenced by items related to TCK, such as statement 26 with a mean score of 4.28: "I can take advantage of multimedia (e.g., video, slideshow, etc.) to express my ideas about various topics in English" and statement 3: "I feel confident that I can successfully teach relevant subject content with appropriate use of technology." Additionally, participants reported having self-efficacy and knowledge of motivating students to engage in technology-based projects and creating multimedia materials suitable for learning purposes. This was supported by items related to TPK, such as statement 8: "I feel confident that I can motivate my students to participate in technology-based projects" and statement 34: "I can design learning materials by using technology that supports students' language learning", whose mean scores were 4.15 and 4.08 respectively.

However, it was observed that all the statements related to TPACK scored below the mean score of 3.93, suggesting that participants faced challenges in synthesising their knowledge of technology, content, and pedagogy for EFL teaching. Specifically, a low mean score for statement 37: "I can support students as they use technology to support their development of language skills in an independent manner" suggested a lack of ability to support and guide students in independent EFL learning through technology. Participants also expressed a lack of self-efficacy in consistently using technology in effective ways or in collecting student tests and products to improve instructional practices (see statements 10 and 16 in Appendix F).

Statements 20 and 24 (see Appendix F), related to TK, ranked in the bottom two of the mean score list. This suggested that some EFL pre-service teachers had concerns about troubleshooting computer issues and aligning collaboration tools with instructional objectives. Notably, in the interviews, some participants attributed their low ratings to their unfamiliarity with digital devices in local schools and the specific collaborative tools such as Edmodo and 3D virtual environments mentioned in statement 24. With the assistance of mentors and local students, participants reported that they quickly acquired the skills to solve technical problems, such as internet connection problems and projector malfunctions. Meanwhile, they shared that they had used a variety of other collaborative tools extensively in their teaching practice, such as Padlet, Nearpod, and Peer Deck. In summary, the quantitative results indicated that participants generally had a good level of self-efficacy and TPACK. However, there were discernible differences in their readiness levels for technology integration, which can be attributed to the diversity of their lecture

experiences at university and their teaching experiences in local schools. These distinctions will be further expounded upon in the subsequent analysis.

4.2 Qualitative Results

The qualitative phase addresses the second research question: *What prior training and experiences influence EFL pre-service teachers' self-efficacy and TPACK?* A total of 10 EFL pre-service teachers volunteered to participate in the interviews, with two participants from the low-readiness group, five from the medium-readiness group, and three from the high-readiness group. Table 4.4 presents a profile of the interview participants. As can be seen, participants had varying lengths of experience teaching at local primary and/or secondary schools. While interviewees with high readiness all accumulated the longest duration of teaching practicums, spanning 22 weeks, the determining factor of their readiness for technology integration was not the length but whether they were given sufficient opportunities, technical resources, and support to gain hands-on technological experiences, as will be elaborated in Sections 4.2.1. To maintain anonymity, participants in this study were labelled numerically and presented in ascending order based on their total scores, ranging from the lowest score of 113 to the highest score of 184.

Table 4.3

A Profile of Interview Participants

Participants	University	Year of Study	Gender M=Man W=Woman	School Level During Teaching Practicums	Length of Teaching Practicums (weeks)	The score of Readiness Level (low to high)	Readiness Levels
Participant 1	B	4	M	Primary	8	113	Low
Participant 2	A	5	W	Secondary	6	119	Low
Participant 3	A	5	W	Both primary and secondary	22	150	Medium
Participant 4	A	5	W	Both primary and secondary	22	154	Medium
Participant 5	A	3	W	Secondary	6	154	Medium

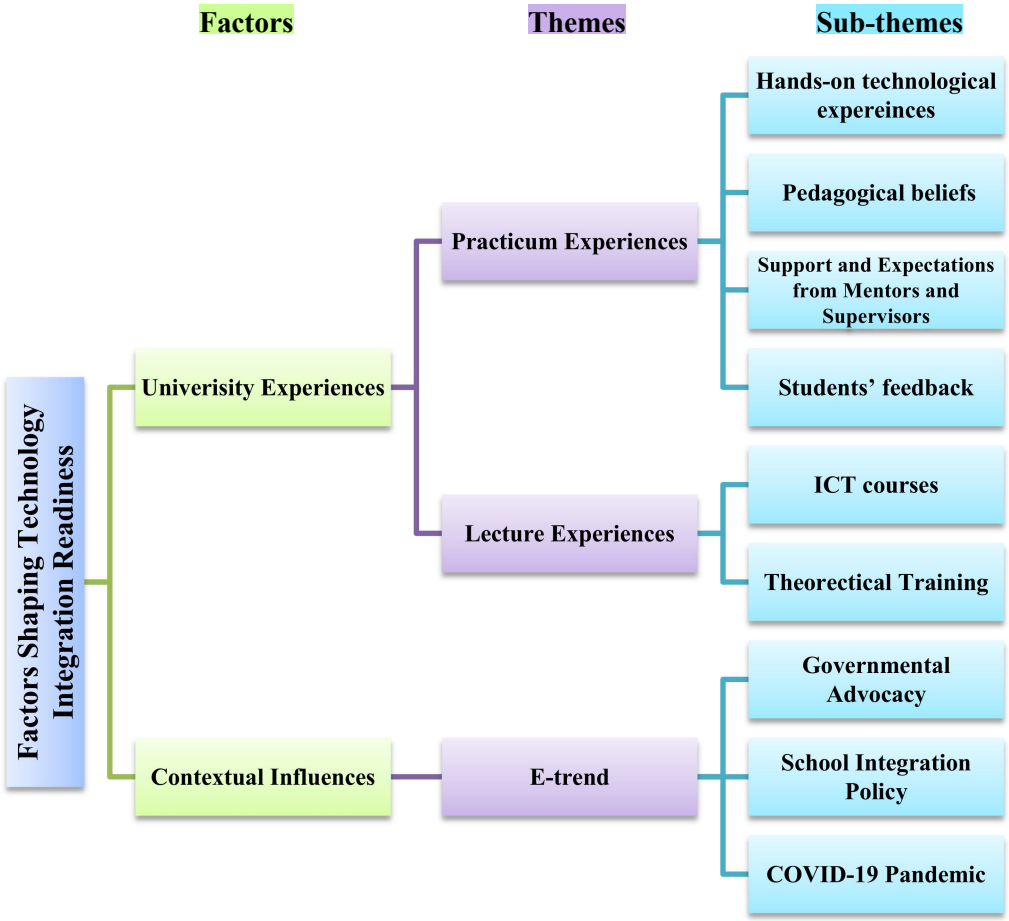
Participant 6	A	5	W	Both primary and secondary	22	157	Medium
Participant 7	B	4	W	Secondary	8	163	Medium
Participant 8	A	4	W	Secondary	22	171	High
Participant 9	A	5	W	Both primary and secondary	22	173	High
Participant 10	A	5	M	Secondary	22	184	High

Following Braun and Clarke's (2006; 2019) reflexive thematic analysis (RTA), as detailed in Section 3.4.2, the six phases of RTA were conducted iteratively and reflexively. In the deductive coding and analysis of the qualitative data, Bandura's (1997) four sources of self-efficacy and Mishra and Koehler's (2006) TPACK framework were used as theoretical lenses. Given the significance of context in educational research and its relevance to the TPACK framework (Rosenberg & Koehler, 2015), this study situated the theoretical lenses within the specific context of Hong Kong. It explored the interplay of governmental policies, teacher education programmes, and local schools' technology integration policies in shaping the technology readiness of EFL pre-service teachers.

The qualitative findings are reported following Braun and Clark's (2013) recommended reporting style for RTA, whereby the data is contextualised and synthesised within this chapter rather than in a separate 'discussion' chapter as the conventional quantitative studies would suggest. This approach is chosen to facilitate the comprehensive reporting of the analysis conducted in this study and its connection with the existing literature. Consequently, a thematic map was generated based on the interview data using a hybrid of deductive and inductive coding and analysis (see Figure 4.2).

Figure 4.2

Thematic Map: Influencing Factors for EFL Pre-service Teachers' Technology Integration Readiness



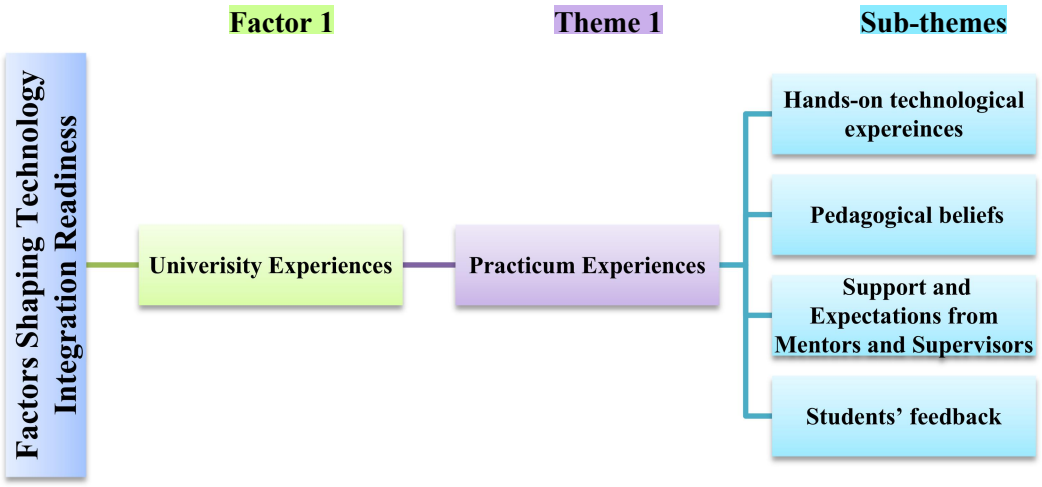
This map illustrates the two primary factors influencing participants' readiness for technology integration: the first factor is their university experiences, which encompass both practicum experiences at local schools and lecture experiences during their teaching-training programme at university; the second factor is contextual influences, in which the 'E-trend' was analysed through three sub-themes derived from the data to assess its impact on participants' readiness levels. The term 'E-trend' is what participants used in the interview to talk about the increasing use of technology in classrooms and needs to be understood within the Hong Kong setting, which will be discussed in Section 4.2.2. All the themes and sub-themes will be expounded upon in the following sections.

4.2.1 Theme 1: Practicum Experiences

Practicum experiences refer to the practical component of participants' teaching training programmes, wherein they were afforded the opportunities to gain teaching experiences within authentic classroom settings. Four sub-themes were constructed that explained how practicum experiences affected pre-service teachers' readiness to integrate technology into their EFL teaching, including hands-on technological experiences, pedagogical beliefs they held or developed during teaching practicums, support and expectations from mentors and supervisors, and students' feedback (see Figure 4.3).

Figure 4.3

Sub-themes of Theme 1: Practicum Experiences



Hands-on technological experiences was the main sub-theme under the theme of practicum experiences. It was derived from Bandura's (1997) concept of enactive mastery experiences, which posits that successful experiences enhance self-efficacy while failure diminishes it. Consistent with previous literature (see Sun et al., 2017), this study found that successful technological experiences during the teaching practicums bolstered teachers' self-efficacy for technology integration. However, it is noteworthy that participants' self-efficacy was not built on effortless success in implementing technology for EFL teaching. Rather, it stemmed from their persistent efforts to explore suitable digital applications and software in their classrooms. This process fostered a resilient mindset, enabling them to overcome obstacles and firmly believe in their capability for success (Bandura, 1997). For instance, participant 7 shared,

> *During my internship, I made a conscious effort to try out various technologies and software. I tried things like the Wheel of Names and Kahoot just to see how they worked in the classroom. Once I had that experience under my belt, I felt more confident and efficient in using these digital tools to achieve my teaching goals. It was a trial-and-error process, but it was worth it in the end!* (Participant 7)

Participant 10 shared this perspective, expressing an increased motivation to explore new technologies after completing the first teaching practicum. Notably, participant 10 attributed this motivation to the positive outcomes resulting from his self-directed exploration of technology, which enhanced his confidence and inspired him to continue experimenting with new technologies and integrating them into his classroom practices. This finding supports Bandura's (1997) assertion that when skill development highlights personal capabilities in generating outcomes through the application of skills, functional improvements are more likely to be sustained.

> *You know, after my first practicum, it really sparked something in me. I started exploring on my own, and when I went for my second practicum, I was all about trying new things and incorporating them into my teaching… And you know what? I managed to apply those things to my teaching successfully. It motivated me to keep trying out new technologies and finding ways to integrate them into EFL teaching.* (Participant 10)

It is worth noting that due to time constraints and pressures to adhere to the curriculum schedule, not all participants had the opportunity to experiment with different technologies during their teaching practicums, especially those who only taught in secondary schools and faced the pressure of preparing students for the Hong Kong Diploma of Secondary Education Examination, akin to mainland China's 'Gaokao' (hereafter referred to as Hong Kong's 'Gaokao'). Additionally, some individuals expressed that using technology can be cumbersome and, at times, less convenient compared to traditional pen-and-paper methods. Participant 1's remarks serve as an exemplification of this observation.

> *To be honest, I'm kind of a newbie when it comes to technology. During my internship, I didn't have much time to learn many different software programs. Plus, with the pressure of keeping up with the curriculum, I found it too bothersome [to use those software programs]. Why bother coming to class early to set up the computer? So, most of the time, I just used the traditional pen-and-paper approach for my classes*.
> (Participant 1)

This finding implies that some participants did not fully achieve 'meaningful use of technology' as defined in Section 2.1. Their integration of technology in the classroom remained superficial, failing to effectively foster students' engagement in EFL learning. For instance, the majority of participants integrated the digital name-picker tool *Wheel of Names* merely for random student selection, a task that could be easily accomplished using conventional paper slips. Only Participant 3 mentioned its potential for effective English vocabulary and grammar learning:

> *Merely using the Wheel of Names for student selection falls short of its capabilities. I incorporate irregular verbs into the wheel and have students draw and articulate their past tense and past participle forms. Additionally, I create sentence fill-in exercises, where students need to deduce and input the correct verb form based on the wheel's output.* (Participant 3)

Moreover, participants prioritised the role of teaching practicums over course lectures, as the latter predominantly emphasised theoretical instruction, a matter that will be further detailed in Section 4.2.2. They stated that it was through the practical experiences of integrating technology into EFL instruction that they gained confidence, particularly when witnessing the tangible impact on students' enhanced motivation to learn English. For instance, participant 9 articulated,

> *Based on my entire university experience, I truly believe that what I learned in classes is just a small piece of the puzzle. The teaching practicum was a game-changer that having EFL teaching-related courses in the classroom couldn't even come close to. I'm telling you, if you can genuinely motivate your students using technology, that's a huge boost for your confidence.* (Participant 9)

Secondly, the **pedagogical beliefs** that participants held or developed during teaching practicums exerted cognitive-level influences on their readiness for technology integration. This influence was observed in its bidirectional relationship with hands-on technological experiences. The study revealed that practical EFL teaching experiences using technology played a pivotal role in shaping participants' pedagogical beliefs regarding technology integration. These beliefs, in turn, influenced how participants evaluated their technological experiences and their subsequent intention to explore technology integration. This was articulated by Participant 2:

> *Because I had limited exposure to technology before my teaching practicum, I pushed myself to explore [technology] and realised that traditional methods couldn't meet certain needs. For example, using a digital platform worked better when I wanted students to engage in learning quickly or when I needed something interesting. As I started using these technologies, I noticed that they weren't as difficult as I imagined. It encouraged more student participation and motivated me to keep trying new things.* (Participant 2)

This study also supports evidence from previous observations (e.g., Inan & Lowther, 2010; Teo, 2012) that highlighted how teachers' beliefs regarding the positive impact of technology on student engagement and instructional outcomes contribute to their motivation to incorporate technology into their teaching practices. For instance, Participant 6 shared,

> *I use a lot of game-based learning platforms because I believe it's a great way to engage students and get them actively involved in the classroom. And it's proven to be true. Not only does it make students more active in English class, but it also improves the flow of the lessons and overall classroom efficiency.* (Participant 6)

However, some participants indicated a discrepancy between their beliefs regarding the role of technology and their actual utilisation of technology in the classroom. This finding parallels those observed in earlier studies (see Bate, 2010). Despite acknowledging the potential benefits of technology in EFL teaching, participants faced obstacles that hindered their inclination and their actual technology integration. These barriers included limited access to technological devices (see also Petko et al., 2018), a lack of guidance on integrating TK with English language teaching and learning, and feelings of fear and anxiety associated with technology utilisation. Consequently, participants exhibited varying levels of readiness, which will be further examined concerning these aforementioned factors in Section 4.3.

Support and expectations from mentors and supervisors also impacted participants' readiness for technology integration. These factors were developed through interview questions addressing the influence of vicarious experiences and verbal persuasion on participants' self-efficacy, as proposed by Bandura (1997). During teaching practicums, each pre-service teacher was assigned to a mentor from the local schools. Surprisingly, contrary to Bandura's (1997) and previous studies' findings (e.g., Brown & Inouye, 1978; Maré & Mihai, 2018), which indicate that observing peers or mentors successfully incorporating technology into teaching enhances pre-service teachers' intention and confidence in conducting the same endeavour, some participants in this study reported limited influence from others' experiences with technology use in EFL classrooms. These pre-service teachers felt that observing their peers or mentors using technology merely helped them understand the features of different technologies and software and know how to solve certain technical issues. Interviewees highlighted that their TPACK and confidence were mainly shaped by their practical experiences rather than vicarious ones. Participant 1 commented,

> *Honestly, I didn't feel any particular impact from them. If they know how to use it, that's their skill. It doesn't really concern me.* (Participant 1)

Nonetheless, some participants pointed out that mentors' technical support during the teaching practicum significantly contributed to their technology readiness levels. They stressed how their mentors played a pivotal role in exposing them to diverse tools that could enhance teaching and learning experiences and guiding them to select suitable technologies for EFL teaching. For instance, Participant 9 shared,

> *My mentor was tech-savvy. He introduced me to various online learning platforms like Quizlet and Nearpod. He specifically guided me in choosing the appropriate technology for content delivery, activity design, and assessments, which equipped me with sufficient knowledge when it came to actual implementations.* (Participant 9)

Moreover, some participants expressed that their motivation for technology integration stemmed from the expectations set by their mentors and supervisors, encouraging them to explore a variety of technologies to elevate classroom engagement and optimise teaching effectiveness. Specifically, participants reported that receiving positive feedback regarding their ability to incorporate technology into EFL teaching further fueled their motivation. These findings align with the research of Bandura (1997) and Barton and Dexter (2020), which emphasise the significance of verbal persuasion as a potent source of self-efficacy. This study corroborates the role of evaluative feedback that highlights personal capabilities in fostering self-efficacy beliefs (Bandura, 1997), particularly among pre-service teachers in the initial stages of integrating technology into their EFL teaching practices. However, the extent of mentors' acceptance and competence in utilising and guiding pre-service teachers

for technology integration varied, leading to participants exhibiting diverse levels of readiness, as evidenced by their accounts in Table 4.5.

Students' feedback constitutes another factor that affects participants' readiness levels. In comparison to their teaching experiences in secondary schools, participants reported that the integration of digital games, utilising platforms like Nearpod and Kahoot, resulted in more positive responses from primary students during EFL classes. These findings are consistent with previous research highlighting the favourable association between the utilisation of digital game-based platforms and students' motivation for language acquisition (e.g., Anak Yunus & Hua, 2021; Degirmenci, 2021; Hou, 2018).

Another finding of particular interest was the transformation of relatively passive students into active contributors through the utilisation of online notice boards such as Padlet. Participants 2, 3, 5, and 8 shared their astonishment at the efficacy of digital platforms in fostering an improved understanding of previously reserved students and encouraging their engagement. Participants expressed a profound sense of achievement and heightened confidence resulting from this pedagogical approach.

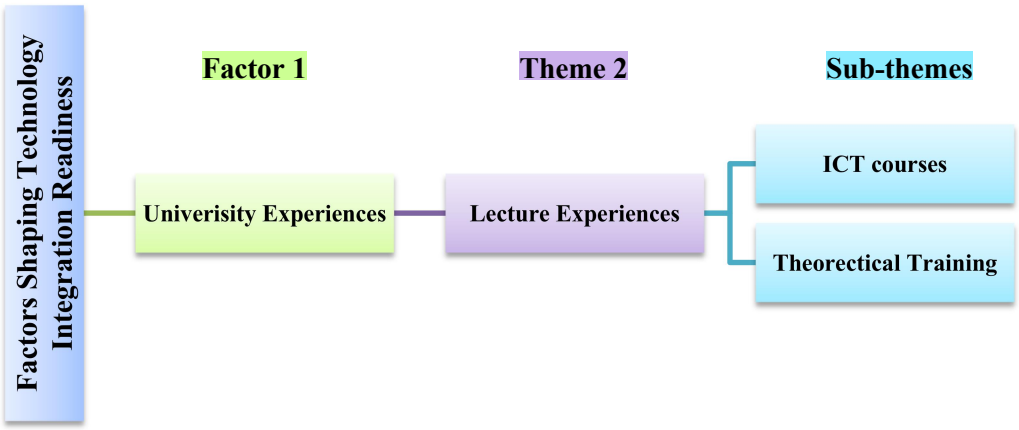
Furthermore, it is worth noting that certain participants were only placed in secondary schools where students were commonly seen as having limited interest in digital gaming and facing significant pressure to succeed in Hong Kong's 'GaoKao'. Consequently, pre-service teachers assigned to these schools encountered limited time and opportunities to experiment with the integration of diverse digital platforms or software tools for EFL teaching. This contributed to one of the factors that explained participants' varying readiness levels for technology integration (see further discussion in Section 4.3).

4.2.2 Theme 2: Lecture Experiences

Lecture experiences encompassed ICT courses and theoretical training provided by participants' respective universities, which constituted another influential factor shaping participants' readiness (see Figure 4.4).

Figure 4.4

Sub-themes of Theme 2: Lecture Experiences



Both university programmes had only one elective **ICT course** available for the pre-service EFL teachers. It is worth noting that in some pathways of University A, this elective course was offered before teaching practicums, while in other pathways of University A and University B, this course was scheduled after these teachers completed their practicums. As a result, the former group felt more prepared to integrate technology into EFL teaching, having been introduced to various digital platforms such as Edpuzzel, Worldwall, and Nearpod. They exhibited higher readiness because they also gained experience in designing WebQuests and e-books and conducting micro-teaching in ICT courses. Participant 3 remarked,

> *It is quite peculiar that the ICT course in my pathway is offered in year five. It would be more beneficial for us to have it before the teaching practicums.* (Participant 3)

Overall, participants acknowledged the usefulness of the ICT course. However, they expressed that a single course was insufficient to provide them with a comprehensive and systematic understanding of integrating technology, content, and pedagogy in a real classroom setting. Participant 3 shared,

> *Micro-teaching in the ICT course is too idealistic, as your 'students' are your classmates. They already know how to use those digital tools, and they cooperate perfectly, giving the illusion that you have completely mastered teaching vocabulary using tools like Quizlet. It's only when you go on placement that you realise using technology can be fraught with issues, such as Wi-Fi connectivity problems or the placement school's reluctance to purchase a shared e-platform account.* (Participant 3)

In addition to ICT courses, participants mentioned that their programmes included various **theoretical training** on EFL teaching, such as pedagogy courses for primary and/or secondary schools. When discussing the effectiveness of these courses in developing their TPACK, participants expressed that the courses were primarily theoretical and did not adequately address

the integration of technology with teaching objectives or the practical challenges they might face. Participant 2 highlighted this gap, stating,

> *Many of the courses focused on pedagogical theory. However, I didn't receive sufficient training on how to integrate technology with teaching objectives or handle practical challenges in the classroom. As a result, during my practicums, I felt a significant disparity between what I learned in theory and the actual classroom reality.* (Participant 2)

Participants 4, 6, and 7 also noted that their theoretical training focused more on combining pedagogical and content knowledge, with limited emphasis on technological knowledge. However, the assessment of teaching performance included the evaluation of how pre-service teachers integrated technology into their instruction, creating a mismatch between theoretical training and teaching practicum requirements.

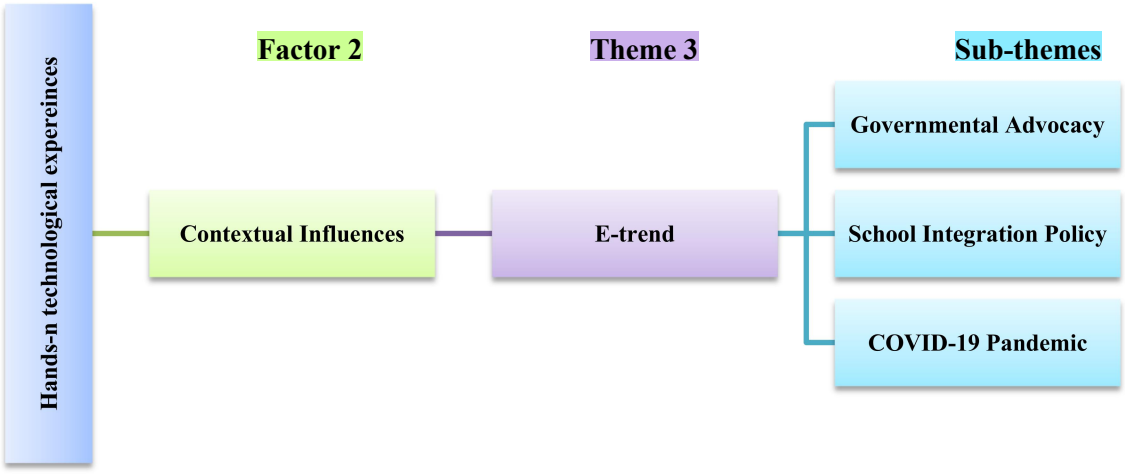
Furthermore, it is noteworthy that the extent to which EFL pre-service teachers were exposed to and had the chance to familiarise themselves with technologies for EFL teaching was also contingent upon contextual factors, which will be further illustrated in the next section.

4.2.3 Theme 3: E-trend

Three sub-themes were crafted under the theme of E-trend, which involved governmental advocacy, school integration policy, and the COVID-19 Pandemic (see Figure 4.5).

Figure 4.5

Sub-themes of Theme 3: E-trend



When exploring the contextual factors affecting their readiness for technology integration, a significant number of EFL pre-service teachers consistently referred to the prevalent **E-trend** in Hong Kong. They elaborated on how this E-trend signifies a societal push towards incorporating

ICT resources into EFL classrooms. These insights imply that the four ITEd strategies described in Section 2.1.2 have played a pivotal role in shaping a trend where the utilisation of digital resources in EFL courses has become widespread across primary and secondary schools in Hong Kong.

Governmental advocacy, represented by the influential role of the Hong Kong Education Bureau (EDB), significantly contributes to the observed trend of integrating ICT resources into local primary and secondary schools. During the interviews, participants consistently highlighted the EDB's impact on shaping educational practices and policies related to technology integration. Participant 4, in particular, shed light on the pervasive influence of the EDB, which is evident not only in the verbal discourse but also in the official online presence of these schools.

> *I believe that currently, many schools in Hong Kong, particularly primary and secondary schools, are influenced by the Education Bureau. If you visit their [schools'] official websites, you will find that they all advocate for integrating IT resources into the classroom.* (Participant 4)

School integration policy is closely related to the EDB's advocacy. Some participants provided concrete examples of how the government has impacted the provision and utilisation of technological devices in schools. Participant 10 mentioned that the schools he was placed in adopted the Bring Your Own Device (BYOD) policy proposed by the EDB (EDB, 2021). This policy allows students to bring their mobile computer devices to school for educational purposes. Under such policies, teachers could spare the hassle of applying in advance to borrow iPad devices for students from the school. They also had the opportunity to fully utilise digital devices to create immersive and interactive EFL learning environments while being able to monitor the responses of different students on iPads in real time.

> *I didn't expect this school to have such well-equipped facilities. It not only applied for funding from the Education Bureau to install AirPlay in every classroom but also allowed students to bring their own devices. This provides me with many opportunities to share various online memes and videos, project them onto the projector, or directly send them to each student's iPad. It has created an immersive and interactive English learning environment, and the students have responded positively, which has boosted my knowledge and confidence in using technology.* (Participant 10)

However, it is worth noting that not all schools where interviewees conducted teaching practicums adopted BYOD, resulting in varying technological experiences and readiness levels for future technology integration, which will be further illustrated in Section 4.3.

The COVID-19 pandemic is another recurrent theme brought up by six participants who experienced online teaching against this backdrop. They spontaneously discussed its impact on the E-trend when they conducted teaching using platforms such as Google Classrooms and Zoom.

They highlighted how the pandemic and subsequent lockdown compelled them to explore and utilise a range of digital tools. While most of them acknowledged that their proficiency in using these tools improved over time, a few participants admitted feeling unprepared at the start of their practicums. Participant 2 exemplified this sentiment by sharing,

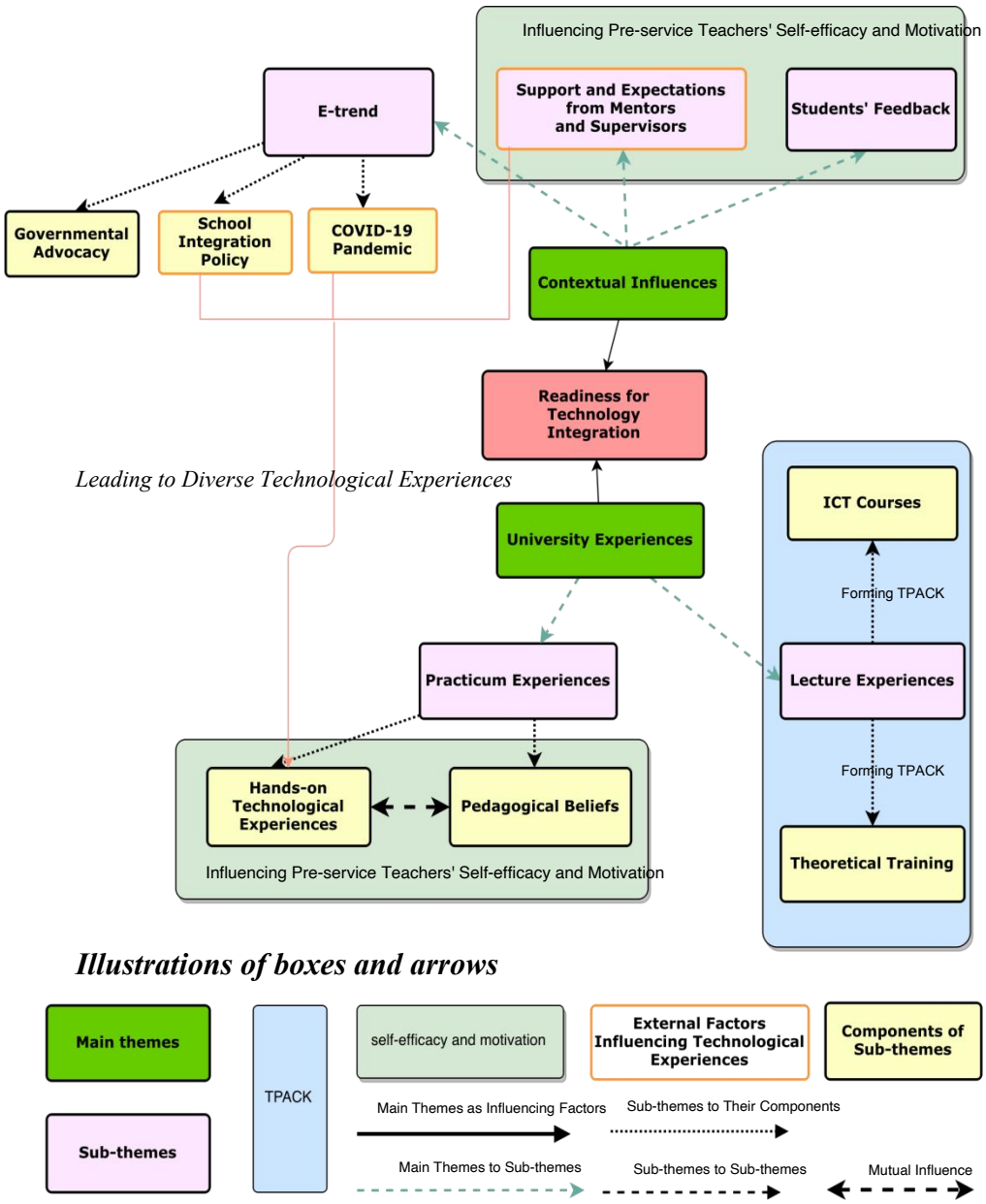
> *During the COVID-19 pandemic, you had to rely on electric devices because there were times when classes were suddenly suspended and you couldn't attend school in person. When I started using them myself, I found it quite challenging because, although everyone was encouraging us to use them, we didn't receive any professional training or proper support to enhance our abilities in this 'E-field'. So, it was a mix of desire and the realisation that my skills might not be fully up to par.* (Participant 2)

4.2.4 An Overview of Interview Results

An overview of the factors influencing EFL pre-service teachers' readiness for technology integration is presented in the diagram below (see Figure 4.6). The diagram illustrates that teachers' readiness for technology integration is predominantly influenced by their experiences at the university level and contextual factors within the context of Hong Kong. This diagram provides a visual representation of the interconnectedness between different themes and sub-themes, offering a nuanced understanding of how participants' self-efficacy and TPACK were shaped by their practicum and lecture experiences. Furthermore, it highlights the role of contextual influences, such as the COVID-19 pandemic, school integration policy, and support and expectations from mentors and supervisors, in shaping participants' diverse technological experiences and their resulting variations in readiness levels. Detailed discussions on participants' accounts of their training and experiences in relation to their reported level of TPACK and self-efficacy will follow below (see Section 4.3).

Figure 4.6

A Visual Map of Influencing Factors on EFL Pre-service Teachers' Readiness for Technology Integration



4.3 Synthesising Quantitative and Qualitative Findings: Toward a Comprehensive Integration

This section addresses the mixed research question: *How do prior training and the experiences of EFL pre-service teachers explain their reported level of TPACK and self-efficacy?* Table 4.5 provides a joint display of integration results, illustrating the interconnections between the quantitative and qualitative datasets. It serves to visually represent how the qualitative data enriches the interpretation and comprehension of the quantitative findings (Creswell & Plano Clark, 2018).

Table 4.4

A Joint Display of Interview Quotes Related to EFL Pre-service Teachers' Self-reported Level of Self-efficacy and TPACK

Self-efficacy/TPACK	High Readiness Level (scores ranging from 171 to 184)	Medium Readiness Level (scores ranging from 137 to 170)	Low Readiness Level (scores ranging from 113 to 136)
Enactive Mastery Experiences	*"I have also worked as an online tutor or mentor for oral practice in some schools. I think these experiences have helped me determine which digital tools would be more effective for different types of students."*	*"I had one course that required me to tutor Hong Kong primary students' oral English using Zoom."*	*"I didn't have any teaching practices using technology except for the practicums."*
Verbal persuasions	*"The schools where I teach, my mentor, and my university supervisor all encourage the use of digital technology. My students are always clamouring to play Kahoot!"*	*"My supervisor specifically mentioned that she expected to see me integrating technology when she came to observe my class."*	*"The school I went to was pretty old-school, and my mentor didn't really care if I used technology or not."*
Physiological and affective states	*"If the Wi-Fi gets interrupted, I might get a little flustered, but I won't get stuck. I'll immediately think of another solution, like using the blackboard and chalk instead."*	*"Using IT, particularly when each student has their own iPad, can disrupt classroom order and make classroom management more challenging. This can significantly affect my emotions when the situation becomes chaotic."*	*"I struggled with the built-in smart board as it requires specific methods that I am not familiar with. It was quite anxiety-inducing and annoying."*

Vicarious experiences	*"My mentor used Notability where students could follow along with the notes and access online resources. When I started using this method, I realised its effectiveness. However, it was through firsthand experience that my confidence truly improved."*	*"Their (Peer colleagues') experiences serve as a reference for me to handle classroom discipline when primary students get overly excited during digital game activities."*	"*Honestly, I didn't feel any particular impact from them. If they know how to use it, that's their skill. It doesn't really concern me.* "
TK	*"I've mastered all the digital programs or platforms that the teachers at my university have used and explored innovative ones on my own to stay updated."*	*"I use PowerPoint for every class and often incorporate popular digital platforms such as Kahoot, Padlet, and Nearpod."*	*"I'm kind of a newbie when it comes to technology."*
TPK	*"I mainly use PowerPoint to connect the entire class. I also incorporate some game-based classroom activities into the lessons."*	*"Compared to physical books, I prefer providing students with e-books and using a laser pointer to guide my presentation on the PPT."*	*"I use PeerDeck mainly to make the classroom more engaging, without any other specific intentions."*
TCK	*"All the electronic resources I choose, such as videos and memes, are based on the themes of that course."*	*"Since I have a good grasp of English subject knowledge, I often think about how to utilise technology more flexibly to enhance content delivery."*	*"At my school, completing the curriculum is a top priority. Only after that, you have the opportunity to think about how to use technology to enrich the classroom."*
TPACK	*"When planning a lesson, I consider the context and language objectives, and choose teaching methods and technology accordingly."*	*"I use online resources to enhance the textbook content, using features like highlighting and animations to engage students and improve their learning experience."*	*"I primarily use electronic tools to make the classroom more engaging. I haven't specifically considered how they relate to teaching methods or content."*

This study presents several key findings based on the data presented in Table 4.5. Firstly, the findings align with Bandura's (1997) assertion that enactive mastery experiences, specifically

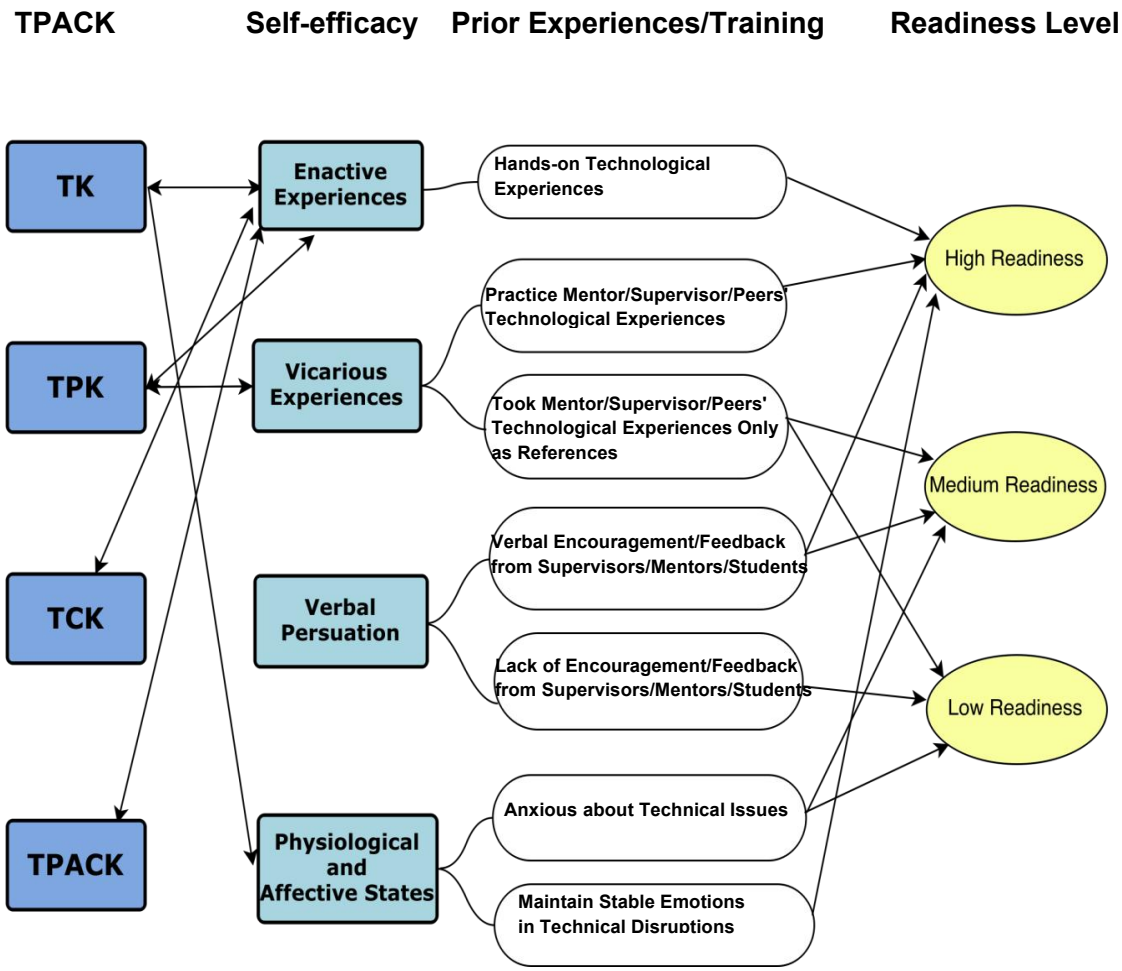
experiences of teaching EFL with technology in this study, serve as the primary source for participants' self-efficacy. Comparing participants with high and medium levels of readiness for technology integration, those with low readiness demonstrated limited prior teaching experiences involving technology. In terms of vicarious experiences, the high and medium-readiness groups regarded them as valuable sources for enhancing their technological skills, whereas the low-readiness group reported minimal influence from such experiences. Concerning physiological and affective states, the low-readiness group felt overwhelmed when confronted with technical issues. Conversely, participants who were better prepared demonstrated the ability to quickly regain composure and employ alternative strategies to ensure smooth content delivery in the face of challenging technical issues. Additionally, the low-readiness groups expressed that despite the government's advocacy for the incorporation of technology in education, the schools where they conducted their teaching practicums did not implement BYOD policies and lacked sufficient digital devices that they could utilise. Furthermore, they mentioned a lack of professional support from their mentors regarding the integration of technology into their teaching practices, as their mentors prioritised the completion of content and teaching objectives over the integration of technology.

In terms of TPACK, the high-readiness groups demonstrated a broader range of technology usage and expressed a strong motivation to stay updated with new technologies. Conversely, the low-readiness group expressed unfamiliarity with integrating technology into EFL teaching. When it comes to the integration of content, pedagogy, and technology, the more prepared participants emphasised the importance of using technology to create an immersive EFL learning environment. Guided by specific teaching objectives, they purposefully incorporated online digital resources to expand the teaching content and carefully selected technologies to optimise students' learning experiences. In contrast, the low-readiness group indicated that stimulating students' learning motivation and engagement were their primary concerns, without giving sufficient consideration to the alignment between technology and content or pedagogy.

A visualised diagram depicting the interrelation between TPACK and self-efficacy, along with the influence of participants' prior experiences and training on their readiness for technology integration, is presented in Figure 4.7 (see below).

Figure 4.7

A Visual Diagram: Interrelation of TPACK, Self-Efficacy, Participants' Prior Experiences/Training, and Readiness Levels



This study revealed that TK, TPK, TCK, TPACK, and participants' enactive experiences, represented by their hands-on technological encounters, were mutually influenced. Participants with high levels of TK, TPK, TCK, TPACK, and sufficient practical experiences in integrating technology into EFL teaching demonstrated high levels of readiness for future practices.

Meanwhile, a bidirectional relationship was observed between TPK and vicarious experiences: participants indicated that their TPK influenced how they perceived and comprehended their peers', supervisors', or mentors' technological experiences, and reciprocally, these vicarious experiences contributed to the development of their TPK. Participants who put vicarious experiences into practice exhibited high readiness levels, while those who merely regarded them as references showed medium or low readiness levels. Furthermore, the study found that the level of verbal support received from supervisors and mentors, along with the diverse feedback from students regarding the integration of technology into the classroom, resulted in participants' varying levels of readiness for technology integration in the future. However, no direct relationship was found between TPACK and verbal persuasion, indicating that participants' understanding of the relationship between technology, pedagogy, and content was not affected by others' encouragement or evaluative feedback regarding technology integration.

Moreover, the study revealed that participants' proficiency in dealing with technical issues depended on their TK. Those lacking TK tended to feel anxious and overwhelmed when faced with technical disruptions. In contrast, individuals with sufficient TK reported being able to swiftly adjust their emotions and ensure seamless content delivery using alternative approaches when unexpected technical issues arose. Consequently, individuals with strong technological competencies obtained higher scores in the readiness level survey.

In conclusion, this diagram serves to bridge the self-efficacy theory and TPACK model, aiming to illustrate their combined explanatory power in elucidating the multifaceted nature of participants' readiness for technology integration. It underscores the importance of considering the interplay of participants' perceived TPACK, self-efficacy, and prior experiences and training when examining their readiness levels.

Chapter 5: Conclusion and Future Implications

This chapter provides a comprehensive summary of the main findings from this explanatory mixed methods study. It highlights the implications of these findings, elucidating their significance for both theoretical comprehension and practical implementation. Additionally, it offers recommendations for future research in the realm of pre-service teachers' readiness for technology integration.

5.1 Summary of the Findings

This study set out to explore EFL pre-service teachers' readiness for future technology integration in Hong Kong. To answer the first research question: W*hat are EFL pre-service teachers' perceived levels of self-efficacy and TPACK in integrating technology into their teaching practices?*, this study measured pre-service teachers' readiness by totalling their scores from the CTIS (Wang et al., 2004) and the TPACK-EFL Survey (Baser et al., 2016). Overall, survey participants generally exhibited a positive outlook on their readiness for future technology integration practices, with the majority of them achieving a medium readiness score.

In-depth interviews were conducted to address the second research question, *What prior training and experiences influence the self-efficacy and TPACK of EFL pre-service teachers?*. Through a rigorous investigation of the factors that influenced pre-service teachers' readiness for technology integration, it becomes apparent that their readiness is influenced by a blend of experiential factors (e.g., university experiences and lecture experiences) and contextual factors (e.g., students' feedback, the COVID-19 pandemic, and governmental policy). Among these factors, this study revealed the critical role that pre-service teachers teaching practicums in Hong Kong local schools played in shaping their opportunities to acquire knowledge, engage with, and experiment using various technologies. Aligning with Bandura's (1997) self-efficacy theory, participants' technological experiences were identified as the most powerful source of their confidence in integrating technology.

Quantitative and qualitative findings were synthesised to answer the third research question: *How do prior training and the experiences of EFL pre-service teachers explain their reported level of self-efficacy and TPACK?*. This study revealed that not all participants obtained adequate hands-on technological experiences during their practicums due to various factors, such as limited access to technological devices, a lack of guidance on integrating TK with EFL teaching, and the pressures associated with preparing students for Hong Kong's 'Gaokao'. Additionally, while participants acknowledged the value of university training, they expressed that a single ICT course and lectures that predominantly focused on pedagogical theories, without corresponding guidance on the integration of pedagogy, content, and technology into practice, were insufficient to prepare them for future EFL teaching.

Furthermore, the varying readiness scores among the interview participants suggested that not all possessed the necessary knowledge and skills to effectively integrate technology into their prospective EFL classrooms. This stresses that there is still room for teacher-training programmes to improve so that they better prepare pre-service teachers for their future teaching practices, as will be discussed below.

5.2 Theoretical and Practical Implications

On a theoretical level, this study integrated Bandura's (1997) self-efficacy theory and Mishra and Koehler's (2006) TPACK model. These theoretical frameworks were employed as fundamental pillars across multiple stages of the research, including the selection of survey instruments, the design of interview protocols, and the interpretation and analysis of both quantitative and qualitative data. This study revealed that Wang et al.'s (2004) CTIS and Baser et al.'s (2016) TPACK-EFL Survey served as sound measurements for understanding EFL pre-service teachers' perceived self-efficacy, knowledge, and skills related to technology integration. Taken together, they have proven to be reliable instruments that offer insights into participants' readiness levels for technology integration into future classrooms. However, while the TPACK-EFL Survey (Baser et al., 2016) generally served the purpose of measuring participants' TPACK, certain statements in this survey were found to be incongruent with participants' actual technological practices, suggesting the need for an updated or more contextually tailored survey for understanding EFL pre-service teachers' TPACK levels in Hong Kong settings (see Section 4.1.3 for detailed discussion).

While Sun et al. (2017) explored pre-service teachers' readiness for technology integration from a combined knowledge-based and self-efficacy-based perspective, this study extends the current understanding by connecting the TPACK model and self-efficacy theory to participants' past experiences and training (see Table 4.4). This comprehensive approach enhanced the qualitative understanding of the interconnectedness of factors influencing teachers' readiness for technology integration through the use of a visualised diagram (see Figure 4.6). Furthermore, this study provides a more nuanced portrayal of the reasons behind the varying levels of readiness for technology integration perceived by the participants (see Figure 4.7).

From a practical standpoint, despite the relatively limited sample size, this study serves as the first mixed methods exploration of EFL pre-service teachers' readiness for technology integration within the specific context of Hong Kong. It provides valuable insights into the experiential and contextual factors that have influenced their readiness levels. Moreover, the findings of this study resonate with similar research conducted in both OECD countries, such as Belgium (Tondeur et al., 2017) and Australia (Gill & Carlson, 2015), as well as non-OECD member countries like South Africa (Chigona & Chigona, 2013), regarding how pre-service teachers perceive their readiness for future technology integration. These collective findings

highlight the shared sentiment among pre-service teachers that they do not feel adequately prepared for integrating technology into their future teaching practices.

An important practical contribution of this study is the suggestions made for teaching-training programmes to better prepare EFL pre-service teachers for future technology integration. Based on the expectations and areas for improvement voiced by participants in EFL teacher-training programmes, this study argued for the following four aspects.

Firstly, universities should offer a more diverse range of ICT courses that can be flexibly selected prior to pre-service teachers' teaching practicums. Currently, some participants are only able to take such courses after their practicums, and they believe that having prior knowledge about various technologies available for EFL teaching would have better prepared them theoretically before their actual teaching experiences in local schools.

Secondly, more professional training for both teacher educators and pre-service teachers should be provided, which would enable them to develop a systematic understanding of how to integrate content, pedagogy, and technology into EFL teaching for specific ages or grade levels. As participants articulated, they were eager to receive guidance on how to align pedagogical theories with practical teaching practices. They also argued for a stronger connection between university courses and the assessment criteria used during teaching practicums.

Additionally, teacher-training programmes should equip pre-service teachers with sufficient knowledge to resolve technical issues and customise technology usage to accommodate the diverse requirements of their students. Pre-service teachers also expressed the need for guidance in meeting the needs of marginalised learners with physical or psychological impairments when incorporating technology into their instructional practices.

Moreover, since participants highly appreciated the chances to interact with state-of-the-art technology exhibitions and collaborate on teaching projects alongside educators from other universities in Hong Kong, it is crucial for teacher-training programmes to incorporate these opportunities for pre-service teachers. By doing so, these programmes can significantly enhance their professional growth and expose them to innovative teaching practices.

However, while the Hong Kong Education Bureau has implemented four strategies for information technology (IT) integration in education since 1988 (see more detail in Section 2.1.2), to the best of my knowledge, the latest strategic plan was proposed in 2014. As of now, there have been no new plans or policy documents published regarding the effectiveness of previous plan implementations. Therefore, it is difficult to determine when and how these suggestions or expectations will be appropriately addressed. However, as this research nears completion, the author finds that University A has newly launched an interdisciplinary programme (Bachelor of Arts (Honours) in English Studies and Digital Communication, n.d.). This signals a growing focus on nurturing pre-service EFL teachers with robust digital literacy skills. Future studies could

investigate whether this and future similar programmes solve the aforementioned issues and better prepare pre-service EFL teachers to work in increasingly technology-driven classrooms.

5. 3 Recommendations for Future Research

Given the limited number of participants in this study, it is recommended that future studies include a larger sample size from diverse universities to gain a more comprehensive picture of Hong Kong EFL pre-service teachers' technology integration readiness. Additionally, an updated survey should be designed to ensure a more precise measurement of pre-service teachers' readiness levels. The TPACK survey items could be developed based on the prevalent hardware (e.g., projectors and iPads) and various web or digital game-based applications (e.g., Padlet, WorldWall, and Eddpuzzle) commonly utilised in primary and secondary school classrooms in Hong Kong, as identified in this study. These items can be used to assess the TK of pre-service EFL teachers from other universities and evaluate their integration of these technologies into instructional practices. Additionally, self-efficacy items can be expanded to include mobile technology and categorised based on Bandura's four sources to better understand their respective impacts.

Importantly, it is observed that there is a large degree of randomness in how pre-service teachers are assigned to local schools. This randomness resulted in variations in the technological experiences of pre-service teachers due to factors such as the availability of electronic devices, technology integration policies at the placement schools, mentors' proficiency in integrating technology into EFL teaching and providing guidance, and the grade levels of the students they taught. Therefore, future research is needed to explore how different stakeholders, including school policymakers, mentors, and teacher educators, can collaborate to establish more equitable, systematic, and organised teaching practices for pre-service teachers to improve their readiness for future technology integration.

Moreover, a noteworthy theme that surfaced in this study is the tension between governmental advocacy for technology integration and the practical implementation in local schools, particularly secondary schools that perceive the inclusion of digital devices or digital games as potential distractions for students preparing for Hong Kong's 'Gaokao'. Future research is encouraged to delve into strategies and approaches that can adequately prepare pre-service teachers to navigate these tensions and effectively integrate technology into their future teaching practices. This exploration should aim to equip pre-service teachers with the necessary skills and knowledge to confidently experiment with various technologies while addressing the concerns and expectations of local school contexts.

In conclusion, this study presents a rich investigation into the readiness of EFL pre-service teachers regarding technology integration, specifically within the context of Hong Kong. The study delves into their prior teaching and training experiences in considerable depth. Given the

rapid advancements in technology, ongoing research is crucial for exploring the readiness of EFL pre-service teachers for technology integration in future instructional practices across different contexts. It is essential not only to comprehend their readiness levels and expectations towards teacher-training programmes but also to ascertain effective strategies for translating their ideas into practical implementation.

References

Abdu, A. K. (2018). A review of technology integration in ELT: From CALL to MALL. Language Teaching and Educational Research, 1(1), 1–12.

Adams, W. C. (2015). Conducting semi-structured Interviews. In K. E. Newcomer, H. P. Hatry, & J. S. Wholey (Eds.), *Handbook of practical program evaluation* (pp. 492–505). John Wiley & Sons.

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

An, Y. J., & Reigeluth, C. (2011). Creating technology-enhanced, learner-centered classrooms: K–12 teachers' beliefs, perceptions, barriers, and support needs. *Journal of Digital Learning in Teacher Education, 28*(2), 54–62. https://doi-org.ezproxy-prd.bodleian.ox.ac.uk/10.1080/21532974.2011.10784681

Anak Yunus, C. C., & Hua, T. K. (2021). Exploring a gamified learning tool in the ESL classroom: The case of Quizizz. *Journal of Education and e-Learning Research*, *8*(1), 103–108. https://doi.org/10.20448/journal.509.2021.81.103.108

Anderson, S. E., Groulx, J. G., & Maninger, R. M. (2011). Relationships among preservice teachers' technology-related abilities, beliefs, and intentions to use technology in their future classrooms. *Journal of Educational Computing Research*, *45*(3), 321–338. https://doi-org.ezproxy-prd.bodleian.ox.ac.uk/10.2190/EC.45.3.d

Atabek, O. (2020). Associations between emotional states, self-efficacy for and attitude towards using educational technology. *International Journal of Progressive Education*, *16*(2), 175–194. https://doi.org/10.29329/ijpe.2020.241.12

Ayres, L., Kavanaugh, K., & Knafl, K. A. (2003). Within-case and across-case approaches to qualitative data analysis. *Qualitative health research*, *13*(6), 871–883. https://doi-org.ezproxy-prd.bodleian.ox.ac.uk/10.1177/1049732303013006008

Bai, B.,Wang, J., & Chai, C. S. (2021) Understanding Hong Kong primary school English teachers' continuance intention to teach with ICT. *Computer Assisted Language Learning*, *34*(4), 528–551, https://doi.org/10.1080/09588221.2019.1627459

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological review*, *84*(2), 191. https://doi.org/10.1037/0033-295X.84.2.191

Bandura, A. (1988). Organizational application of social cognitive theory. *Australian Journal of Management, 13*(2), 275–302. https://doi-org.ezproxy-prd.bodleian.ox.ac.uk/10.1177/031289628801300210

Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman and Company.

Bandura, A. (1999). A social cognitive theory of personality. In L. Pervin, & O. John (Eds.), *Handbook of personality* (2nd ed., pp. 154–196). Guilford Publications

Bandura, A. (2006). Toward a psychology of human agency. *Perspectives on Psychological*

Science, *1*(2), 164–180. https://doi.org/10.1111/j.1745-6916.2006.00011.x

Barton, E.A., Dexter, S. (2020). Sources of teachers' self-efficacy for technology integration from formal, informal, and independent professional learning. *Education Tech Research Dev* , *68*, 89–108 . https://doi-org.ezproxy-prd.bodleian.ox.ac.uk/10.1007/s11423-019-09671-6

Baser, D., Kopcha, T. J., & Ozden, M. Y. (2016). Developing a technological pedagogical content knowledge (TPACK) assessment for preservice teachers learning to teach English as a foreign language. *Computer Assisted Language Learning*, *29*(4), 749–764. https://doi-org.ezproxy-prd.bodleian.ox.ac.uk/10.1080/09588221.2015.1047456

Bate, F. (2010). A bridge too far? Explaining beginning teachers' use of ICT in Australian schools. *Australasian Journal of Educational Technology*, *26*(7). https://doi.org/10.14742/ajet.1033

Beatty, K. (2010). *Teaching & researching: Computer-assisted language learning* (2nd ed.). Routledge.

Blocher, J. M., Armfield, S. W., Sujo–Montes, L., Tucker, G., & Willis, E. (2011). Contextually based professional development. *Computers in the Schools*, *28*(2), 158–169. http://dx.doi.org/10.1080/07380569.2011.577398

Boonmoh, A., Jumpakate, T., & Karpklon, S. (2022). A close look at the use of technology by Thai teachers in secondary EFL classrooms. *Computer Assisted Language Learning*, *23*(1), 78–107.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2012). Thematic analysis. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *APA handbook of research methods in psychology, Vol. 2. Research designs: Quantitative, qualitative, neuropsychological, and biological* (pp. 57–71). American Psychological Association. https://doi.org/10.1037/13620-004

Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative research in sport, exercise and health*, *11*(4), 589–597. https://doi-org.ezproxy-prd.bodleian.ox.ac.uk/10.1080/2159676X.2019.1628806

Braun, V., & Clarke, V. (2021a). Can I use TA? Should I use TA? Should I not use TA? Comparing reflexive thematic analysis and other pattern-based qualitative analytic approaches. *Counselling and Psychotherapy Research*, *21*(1), 37–47. https://doi.org/10.1002/capr.12360

Braun, V., & Clarke, V. (2021b). One size fits all? What counts as quality practice in (reflexive) thematic analysis?. *Qualitative research in psychology*, *18*(3), 328–352. https://doi.org/10.1080/14780887.2020.1769238

Braun, V., Clarke, V. (2013). *Successful qualitative research: A practical guide for beginners*. Sage Publications.

Braun, V., Clarke, V., Hayfield, N., Terry, G. (2019). Thematic Analysis. In: P. Liamputtong (Eds.), *Handbook of Research Methods in Health Social Sciences* (pp. 843–860). Springer. https://doi.org/10.1007/978-981-10-5251-4_103

Brown, I., & Inouye, D. K. (1978). Learned helplessness through modeling: The role of perceived similarity in competence. *Journal of personality and Social Psychology*, *36*(8), 900. https://doi.org/10.1037/0022-3514.36.8.900

Burston, J. (2015). Twenty years of MALL project implementation: A meta-analysis of learning outcomes. *ReCALL, 27*(1), 4–20. https://doi.org/10.1017/S0958344014000159

Byrne, D. (2022). A worked example of Braun and Clarke's approach to reflexive thematic analysis. *Quality & quantity*, *56*(3), 1391–1412. https://doi.org/10.1007/s11135-021-01182-y

Çakmak, F., & Erçetin, G. (2018). Effects of gloss type on text recall and incidental vocabulary learning in mobile-assisted L2 listening. *ReCALL*, *30*(1), 24–47. https://doi.org/10.1017/S0958344017000155

Castillo-Montoya, M. (2016). Preparing for interview research: The interview protocol refinement framework. *The qualitative report*, *21*(5), 811–831. https://doi.org/10.46743/2160-3715/2016.2337

Chae, M., & Kim, J. (2004). Do size and structure matter to mobile users? An empirical study of the effects of screen size, information structure, and task complexity on user activities with standard web phones. *Behaviour & information technology*, *23*(3), 165–181. https://doi.org/10.1080/01449290410001669923

Chen, C.-H., & Tsai, C.-C. (2021). In-service teachers' conceptions of mobile technology-integrated instruction: Tendency towards student-centered learning. *Computers & Education*, *170*, 104224. https://doi.org/10.1016/j.compedu.2021.104224

Chen, R. J. (2010). Investigating models for preservice teachers' use of technology to support student-centered learning. *Computers & Education*, *55*(1), 32–42. https://doi.org/10.1016/j.compedu.2009.11.015

Chigona, A., & Chigona, W. (2013, September). South African pre-service teachers' under-preparedness to teach with information communication technologies. In *2013 Second International Conference on E-Learning and E-Technologies in Education* (ICEEE) (pp. 239-243). IEEE. https://doi.org/10.1109/ICeLeTE.2013.6644381

Chinnery, G. M. (2006). Going to the MALL: Mobile assisted language learning. *Language Learning & Technology*, *10*(1), 9–16. https://www.learntechlib.org/p/74432/.

Choy, L. T. (2014). The strengths and weaknesses of research methodology: Comparison and complimentary between qualitative and quantitative approaches. *IOSR journal of humanities and social science*, *19*(4), 99–104. https://doi.org/10.9790/0837-194399104

Cohen, L., Manion, L., & Morrison, K. (2017). *Research methods in education* (8th ed.). Routledge. https://doi.org/10.4324/9781315456539

Collins, K. M., Onwuegbuzie, A. J., & Sutton, I. L. (2006). A model incorporating the rationale and purpose for conducting mixed-methods research in special education and beyond. *Learning disabilities: a contemporary journal*, *4*(1), 67–100.

Creswell, J. W., & Creswell, J. D. (2022). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). SAGE Publications.

Creswell, J. W., & Plano Clark, V. L. (2007). *Designing and conducting mixed methods research* (1st ed.). SAGE Publications.

Creswell, J. W., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). SAGE Publications.

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.

Creswell, J. W., Plano Clark, V. L., Gutmann, M., & Hanson, W. (2003). Advanced mixed methods research designs. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 209–240). SAGE Publications.

Cullen, T. A., & Greene, B. A. (2011). Preservice teachers' beliefs, attitudes, and motivation about technology integration. *Journal of Educational Computing Research*, *45*(1), 29–47. https://doi.org/10.2190/EC.45.1.b

Curriculum Development Council in Hong Kong (CDC). (2017). *English language education: Key learning area curriculum guide (Primary 1–Secondary 6)*. HKSAR Government Logistic Department.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, *13*(3), 319–340. https://www.jstor.org/stable/249008

Degirmenci, R. (2021). The use of Quizizz in language learning and teaching from the teachers' and students' perspectives: A literature review. *Language Education and Technology (LET Journal)*, *1*(1), 1–11. https://orcid.org/0000-0001-5868-5776

Education and Manpower Bureau. (2004). *Empowering learning and teaching with information technology*. https://www.edb.gov.hk/attachment/en/curriculum-development/renewal/ELE/ELE_KLACG_P1-S6_Eng_2017.pdf

Education Bureau. (2012). *Report on the review surveys of the third strategy on information technology in education*. https://www.edb.gov.hk/attachment/en/edu-system/primary-secondary/applicable-to-primary-secondary/it-in-edu/RS2_Final%20Report_PUBLIC_Eng_clean%2021012013.pdf

Education Bureau. (2014). *The fourth strategy on IT in education: Consultation document*. https://www.edb.gov.hk/attachment/en/edu-system/primary-secondary/applicable-to-primary-secondary/it-in-edu/Policies/4th_consultation_eng.pdf

Education Bureau. (2015). T*he fourth strategy on information technology in Education*. https://www.edb.gov.hk/attachment/en/edu-system/primary-secondary/applicable-to-

primary-secondary/it-in-edu/ITE4_report_ENG.pdf

Education Bureau. (2021, Oct 4). *Implementing "Bring Your Own Device (BYOD)" in primary and secondary schools*. https://www.edb.gov.hk/en/edu-system/primary-secondary/applicable-to-primary-secondary/it-in-edu/BYOD/byod_index.html

Egbert, J. L. (2005). Conducting research on CALL. In J. L. Egbert & G. M. Petrie (Eds.), *CALL research perspectives* (pp. 3–8). Lawrence Erlbaum Associates.

Ertmer, P. A. (1999). Addressing first-and second-order barriers to change: Strategies for technology integration. *Educational technology research and development*, *47*(4), 47–61. https://doi.org/10.1007/BF02299597

Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research and Development*, *53*, 25–39. http://dx.doi.org/10.1007/BF02504683

Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & education*, *59*(2), 423–435. https://doi.org/10.1016/j.compedu.2012.02.001

Farjon, D., Smits, A., & Voogt, J. (2019). Technology integration of pre-service teachers explained by attitudes and beliefs, competency, access, and experience. *Computers & Education*, *130*, 81–93. https://doi.org/10.1016/j.compedu.2018.11.010

Gao, P., Wong, A., Choy, D., & Wu, J. (2011). Beginning teachers' understanding performances of technology integration. *Asia Pacific Journal of Education*, *31*, 211–223. https://doi.org/10.1080/02188791.2011.567003

Gill, L., Dalgarno, B., & Carlson, L. (2015). How does pre-service teacher preparedness to use ICTs for learning and teaching develop through their degree program? *Australian Journal of Teacher Education*, *40*(1), 36–59. https://doi.org/10.14221/ajte.2015v40n1.3

Godwin-Jones, R. (2021). Evolving technologies for language learning. *Language Learning & Technology*, *25*(3), 6–26. http://hdl.handle.net/10125/73443

Graves, K. E., & Bowers, A. J. (2018). Toward a typology of technology-using teachers in the "new digital divide": A latent class analysis of the NCES fast response survey system teachers' use of educational technology in US public schools, 2009 (FRSS 95). *Teachers College Record*, *120*(8), 1–42. http://www.tcrecord.org/Content.asp?contentid=22277.

Harrell, S., & Bynum, Y. (2018). Factors affecting technology integration in the classroom. *Alabama Journal of Educational Leadership*, *5*, 12–18.

Hermans, R., Tondeur, J., Van Braak, J., & Valcke, M. (2008). The impact of primary school teachers' educational beliefs on the classroom use of computers. *Computers & Education, 51*, 1499–1509. https://doi.org/10.1016/j.compedu.2008.02.001

Hou, Yj. (2018). Integration of Kahoot into EFL Classroom. In: C. Stephanidis (Eds.), *HCI International 2018 – Posters' Extended Abstracts*. Springer. https://doi-org.ezproxy-

prd.bodleian.ox.ac.uk/10.1007/978-3-319-92285-0_5

Hsu, S. (2010). The Relationship between teacher's technology integration ability and usage. *Journal of Educational Computing Research*, *43*(3), 309–325. https://doi.org/10.2190/EC.43.3.c

Hu, X. (2015). *Pre-service teachers' information communication technology (ICT): Adoption in preschool settings in Hong Kong* (Unpublished doctoral dissertation). The University of Hong Kong, Hong Kong.

Inan, F. A., & Lowther, D. L. (2010). Factors affecting technology integration in K-12 classrooms: A path model. *Educational Technology Research and Development*, *58*(2), 137–154. https://doi.org/10.1007/s11423-009-9132-y

Ivankova, N. V., Creswell, J. W., & Stick, S. L. (2006). Using mixed-methods sequential explanatory design: From theory to practice. *Field Methods*, *18*(1), 3–20. https://doi.org/10.1177/1525822X05282260

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a definition of mixed methods research. *Journal of Mixed Methods Research*, *1*(2), 112–133. https://doi-org.ezproxy-prd.bodleian.ox.ac.uk/10.1177/1558689806298224

Judson, E. (2006). How teachers integrate technology and their beliefs about learning: Is there a connection?. *Journal of technology and teacher education*, *14*(3), 581–597.

Jäger-Biela, D., Kaspar, K., & König, J. (2020). Opportunities to learn digital media competences. *InEducation, School, Digitalization*, 66–72.

Kadel, R. (2005). How teacher attitudes affect technology integration. *Learning & leading with technology*, *32*(5), 34.

Kamasak, R., Özbilgin, M., Atay, D., & Kar, A. (2021). The effectiveness of mobile-assisted language learning (MALL): A review of the extant literature. *Handbook of research on determining the reliability of online assessment and distance learning*, 194–212. https://doi.org/10.4018/978-1-7998-4769-4.ch008

Kaufman, K. (2014). Information communication technology: Challenges & some prospects from pre-service education to the classroom. *Mid-Atlantic Education Review*, *2*(1).

Kern, R. (2006). Perspectives on technology in learning and teaching languages. *Tesol Quarterly*, *40*(1), 183–210. https://doi.org/10.2307/40264516

Kim, C., Kim, M. K., Lee, C., Spector, J. M., & DeMeester, K. (2013). Teacher beliefs and technology integration. *Teaching and teacher education*, *29*, 76–85. https://doi.org/10.1016/j.tate.2012.08.005

Klímová, B. (2018). Mobile phones and/or smartphones and their apps for teaching English as a foreign language. *Education and Information Technologies*, *23*(3), 1091–1099. https://doi.org/10.1007/s10639-017-9655-5

Koehler, M. & Mishra, P. (2012). Using the TPACK Image [Online Image]. TPACK.ORG.

https://matt-koehler.com/tpack2/using-the-tpack-image/

Koehler, M. J., Mishra, P., & Cain, W. (2013). What is technological pedagogical content knowledge (TPACK)?. *Journal of education*, *193*(3), 13–19. https://doi.org/10.1177/002205741319300303

Koehler, M. J., Mishra, P., Akcaoglu, M., & Rosenberg, J. M. (2013). The technological pedagogical content knowledge framework for teachers and teacher educators. *ICT integrated teacher education: A resource book*, 2–7.

Koehler, M., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)?. *Contemporary issues in technology and teacher education*, *9*(1), 60–70.

Koole, M. (2009). A model for framing mobile learning. In M. Ally (Ed.), *Mobile learning: Transforming the delivery of education & training* (pp. 25–47). AU Press.

Kopcha, T. J. (2012). Teachers' perceptions of the barriers to technology integration and practices with technology under situated professional development. *Computers & Education*, *59*(4), 1109–1121. https://doi.org/10.1016/j.compedu.2012.05.014

Kukulska-Hulme, A. (2018). Mobile-assisted language learning [Revised and updated version]. In C. A. Chapelle (Eds.), *The concise encyclopedia of applied linguistics* (pp. 743–789). Wiley. http://oro.open.ac.uk/57023/.

Kukulska-Hulme, A., & Shield, L. (2008). An overview of mobile assisted language learning: From content delivery to supported collaboration and interaction. *ReCALL*, *20*(3), 271–289. https://doi.org/10.1017/S0958344008000335

König, J., Jäger-Biela, D. J., & Glutsch, N. (2020). Adapting to online teaching during COVID-19 school closure: teacher education and teacher competence effects among early career teachers in Germany. *European journal of teacher education*, *43*(4), 608–622. https://doi.org/10.1080/02619768.2020.1809650

Lailiyah, M., & Cahyono, B. Y. (2017). Indonesian EFL teachers' self-efficacy towards technology integration (SETI) and their use of technology in EFL teaching. *Studies in English Language Teaching*, *5*(2), 344–357. https://doi.org/10.22158/selt.v5n2p344

Law, N., Lee, Y., & Yuen, H. K. (2010). The impact of ICT in education policies on teacher practices and student outcomes in Hong Kong. In F. Scheuermann & F. Pedró (Eds.), *Assessing the effects of ICT in education: Indicators, criteria and benchmarks for international comparisons* (pp. 143–164). OECD Publishing.

Lee, Y., & Lee, J. (2014). Enhancing pre-service teachers' self-efficacy beliefs for technology integration through lesson planning practice. *Computers & education*, *73*, 121–128.

Lemon, N., & Garvis, S. (2016). Pre-service teacher self-efficacy in digital technology. *Teachers and Teaching*, *22*(3), 387–408. https://doi.org/10.1080/13540602.2015.1058594

Levy, M. (1997). *Computer-assisted language learning: Context and conceptualization*. Oxford University Press.

Lim, C. P., & Chai, C. S. (2008). Teachers' pedagogical beliefs and their planning and conduct of computer-mediated classroom lessons. *British Journal of Educational Technology*, *39*(5), 807–828. https://doi.org/10.1111/j.1467-8535.2007.00774.x

Lowther, D. L., Inan, F. A., Daniel Strahl, J., & Ross, S. M. (2008). Does technology integration "work" when key barriers are removed? *Educational Media International*, *45*(3), 195–213. https://doi.org/10.1080/09523980802284317

Maré, M. G. J., & Mihai, M. A. (2018). Factors contributing to the level of acceptance of technology in affluent private schools. *Journal of Research on Technology in Education*, *50*(4), 333–349. https://doi.org/10.1080/15391523.2018.1508389

Miranda, H. P., & Russell, M. (2012). Understanding factors associated with teacher-directed student use of technology in elementary classrooms: *A structural equation modeling approach. British Journal of Educational Technology*, *43*(4), 652–666. https://doi.org/10.1111/j.1467-8535.2011.01228.x

Mishra, P. (2018). *Revised version of TPACK image*. Retrieved April 14, 2019, from https://punyamishra.com/2018/09/10/the-tpack-diagram-gets-an-upgrade/.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers college record*, *108*(6), 1017–1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x

Misieng, J.-, Ramanair, J., & Rethinasamy, S. (2018). Measuring teachers' readiness to use technology. *Journal of IT in Asia*, *8*(1), 7–13. https://doi.org/10.33736/jita.852.2018

Moghari, M. H., & Marandi, S. S. (2017). Triumph through texting: Restoring learners' interest in grammar. *ReCALL*, *29*(3), 357–372. https://doi.org/1017/S0958344017000167

Murthy, S., Warriem, J.M., Iyer, S. (2017). Technology integration for student-centered learning: A model for teacher professional development programs. In: Kong, S., Wong, T., Yang, M., Chow, C., Tse, K. (Eds.), *Emerging Practices in Scholarship of Learning and Teaching in a Digital Era*. Springer. https://doi-org.ezproxy-prd.bodleian.ox.ac.uk/10.1007/978-981-10-3344-5_4

Nath, S. (2019). ICT integration in Fiji schools: A case of in-service teachers. *Education and Information Technologies*, *24*(2), 963–972. https://doi.org/10.1007/s10639-018-9803-6

Ottenbreit-Leftwich, A. & Kimmons, R. (2020). *The K-12 Educational Technology Handbook* (1st ed.). EdTech Books. https://dx.doi.org/10.59668/7

Ottenbreit-Leftwich, A., Glazewski, K., Newby, T. & Ertmer, P. (2010). Teacher value beliefs associated with using technology: addressing professional and student needs. *Computers & Education*, 55, 1321–1335. https://doi.org/10.1016/j.compedu.2010.06.002

Palak, D., & Walls, R. T. (2009). Teachers' beliefs and technology practices: A mixed-methods approach. *Journal of Research on Technology in Education*, *41*, 417–441. http://dx.doi.org/10.1080/15391523.2009.10782537

Park, M., & Son, J. B. (2022). Pre-service EFL teachers' readiness in computer-assisted language learning and teaching. *Asia Pacific Journal of Education*, *42*(2), 320–334. http://dx.doi.org/10.1080/02188791.2020.1815649

Petko, D., Prasse, D., & Cantieni, A. (2018). The interplay of school readiness and teacher readiness for educational technology integration: A structural equation model. *Computers in the Schools*, *35*(1), 1–18. https://doi.org/10.1080/07380569.2018.1428007

Plano, V. L., & Ivankova, N. (2016). *Mixed methods research: A guide to the field*. SAGE Publications.

Polit, D. F., & Beck, C. T. (2010). Generalization in quantitative and qualitative research: Myths and strategies. *International journal of nursing studies*, *47*(11), 1451–1458. https://doi.org/10.1016/j.ijnurstu.2010.06.004

Ranellucci, J., Rosenberg, J. M., & Poitras, E. G. (2020). Exploring pre-service teachers' use of technology: The technology acceptance model and expectancy–value theory. *Journal of Computer Assisted Learning*, *36*(6), 810–824. https://doi.org/10.1111/jcal.12459

Rehmat, A. P., & Bailey, J. M. (2014). Technology Integration in a Science Classroom: Preservice Teachers' Perceptions. *Journal of Science Education and Technology*, *23*(6), 744–755. https://doi.org/10.1007/s10956-014-9507-7

Rosenberg, J. M., & Koehler, M. J. (2015). Context and technological pedagogical content knowledge (TPACK): A systematic review. *Journal of Research on Technology in Education*, *47*(3), 186–210. https://doi.org/10.1080/15391523.2015.1052663

Sang, G., Valcke, M., Van Braak, J., & Tondeur, J. (2010). Student teachers' thinking processes and ICT integration: Predictors of prospective teaching behaviors with educational technology. *Computers & Education*, *54*(1), 103–112. https://doi.org/10.1016/j.compedu.2009.07.010Sa

Schuknecht, L. & Schleicher, A. (2020). Digitale Herausforderungen für Schulen und Bildung [Digital challenges for schools and education]. *Im Blickpunkt*, *73*(5), 68–70

Scott, P., & Mouza, C. (2007). The impact of professional development on teacher learning, practice, and leadership skills: A study on the integration of technology in the teaching of writing. *Journal of Educational Computing Research*, *37*(3), 229–266. https://doi.org/10.2190/EC.37.3.b

Selwyn, N. (2016). Education and technology: Key issues and debates. Bloomsbury Publishing.

Shih, R. C., Lee, C., & Cheng, T. F. (2015). Effects of English spelling learning experience through a mobile LINE APP for college students. *Procedia-Social and Behavioral Sciences*, *174*, 2634–2638. https://doi.org/10.1016/j.sbspro.2015.01.945

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational researcher*, *15*(2), 4–14.

Smarkola, C. (2008). Efficacy of a planned behavior model: Beliefs that contribute to computer usage intentions of student teachers and experienced teachers. *Computers in Human Behavior*, *24*(3), 1196–1215. https://doi.org/10.1016/j.chb.2007.04.005

Sun, Y., Strobel, J., & Newby, T. J. (2017). The impact of student teaching experience on pre-service teachers' readiness for technology integration: A mixed methods study with growth curve modeling. *Educational Technology Research and Development 65*(3), 597–629. https://doi.org/10.1007/s11423-016-9486-x

Stockwell, G. (2014). Mobile-assisted language learning. In M. Thomas, H. Reinders, & M. Warschauer (Eds.), *Contemporary computer assisted-language learning* (pp. 201–217). Bloomsbury Publishing Plc.

Stockwell, G., & Hubbard, P. (2013). Some emerging principles for mobile-assisted language learning. *The International Research Foundation for English Language Education*, 1–15.

Sá, M. J., & Serpa, S. (2020). The global crisis brought about by SARS-CoV-2 and its impacts on education: An overview of the Portuguese panorama. *Scientific Insight Educational Frontiers*, 5(2), 525–530. 525–530. https://doi.org/10.2139/ssrn.3565613

Tafazoli, D., & Meihami, H. (2023). Narrative inquiry for CALL teacher preparation programs amidst the COVID-19 pandemic: Language teachers' technological needs and suggestions. *Journal of Computers in Education*, *10*(1), 163–187. https://doi.org/10.1007/s40692-022-00227-x

Tashakkori, A., & C. Teddlie. (2003). *Handbook of mixed methods in social and behavioral research*. SAGE Publications.

Tashakkori, A., & Creswell, J. W. (2007). Exploring the nature of research questions in mixed methods research. *Journal of mixed methods research*, *1*(3), 207–211. https://doi.org/10.1177/1558689807302814

Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches*. SAGE Publications.

Tearle, P., & Golder, G. (2008). The use of ICT in the teaching and learning of physical education in compulsory education: How do we prepare the workforce of the future?. *European journal of teacher education*, *31*(1), 55–72. https://doi.org/10.1080/02619760701845016

Teddlie, C., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*. SAGE Publications.

Teddlie, C., & Yu, F. (2007). Mixed methods sampling: A typology with examples. *Journal of Mixed Methods Research, 1*(1), 77–100. https://doi-org.ezproxy-prd.bodleian.ox.ac.uk/10.1177/1558689806292430

Teo, T. (2012). Examining the intention to use technology among pre-service teachers: An integration of the technology acceptance model and theory of planned behavior. *Interactive Learning Environments*, *20*(1), 3–18. https://doi.org/10.1080/10494821003714632

Teo, T. (2015). Comparing pre-service and in-service teachers' acceptance of technology: Assessment of measurement invariance and latent mean differences. *Computers & Education*, *83*, 22–31. https://doi.org/10.1016/j.compedu.2014.11.015

Teo, T., Lee, C. B., Chai, C. S., & Wong, S. L. (2009). Assessing the intention to use technology among pre-service teachers in Singapore and Malaysia: A multigroup invariance analysis of the Technology Acceptance Model (TAM). *Computers & Education*, *53*(3), 1000–1009. https://doi.org/10.1016/j.compedu.2009.05.017

The Education University of Hong Kong. (n.d.). *Bachelor of Arts (Honours) in English Studies and Digital Communication*. Retrieved from https://www.eduhk.hk/fhm/programmes/undergraduate-programmes/bachelor-of-arts-honours-in-english-studies-and-digital-communication

Thompson, C. B. (2009). Descriptive data analysis. *Air medical journal*, *28*(2), 56–59.

Tondeur, J., Aesaert, K., Pynoo, B., van Braak, J., Fraeyman, N., & Erstad, O. (2017). Developing a validated instrument to measure preservice teachers' ICT competencies: Meeting the demands of the 21st century. *British Journal of Educational Technology*, *48*(2). https://doi.org/10.1111/bjet.12380

Tondeur, J., Forkosh-Baruch, A., Prestridge, S., Albion, P., & Edirisinghe, S. (2016). Responding to challenges in teacher professional development for ICT integration in education. *Educational Technology and Society*, *19*(3), 110–120. https://www.jstor.org/stable/jeductechsoci.19.3.110

Tondeur, J., Petko, D., Christensen, R., Drossel, K., Starkey, L., & Knezek; G., & Schmidt-Crawford, D. (2020). Quality criteria for conceptual technology integration models in education: Bridging research and practice. *Educational Technology Research and Development*. https://doi.org/10.1007/s11423-020-09911-0

Tondeur, J., van Braak, J., Sang, G., Voogt, J., Fisser, P., & Ottenbreit-Leftwich, A. (2012). Preparing preservice teachers to integrate technology in education: A synthesis of qualitative evidence. *Computers & Education, 59*, 134–144. https://doi.org/10.1016/j.compedu.2011.10.009

Valtonen, T., Sointu, E., Kukkonen, J., Kontkanen, S., Lambert, M. C., & Mäkitalo-Siegl, K. (2017). TPACK updated to measure pre-service teachers' twenty-first century skills. *Australasian Journal of Educational Technology*, *33*(3). https://doi.org/10.14742/ajet.3518

van Broekhuizen, L. (2016). The paradox of classroom technology: Despite proliferation and access, students not using technology for learning. Retrieved from http://www.advanc-ed.org/sites/default/files/AdvancED_eleot_Classroom_Tech_Report.pdf.

Wang, L., Ertmer, P. A., & Newby, T. J. (2004). Increasing Preservice Teachers' Self-Efficacy Beliefs for Technology Integration. *Journal of Research on Technology in Education*, *36*(3), 231–250. https://doi.org/10.1080/15391523.2004.10782414

Wang, Y. (2021). In-Service Teachers' Perceptions of Technology Integration and Practices in a Japanese University Context. *JALT CALL Journal*, *17*(1), 45–71. https://doi.org/10.29140/jaltcall.v17n1.377

Warschauer, M., & Healey, D. (1998). Computers and Language Learning: An Overview. *Language Teaching*, *31*, 51–71. http://dx.doi.org/10.1017/S0261444800012970

Welch, C., & Piekkari, R. (2006). Crossing language boundaries: Qualitative interviewing in international business. *Management International Review*, *46*, 417–437. https://doi.org/10.1007/s11575-006-0099-1

Wellington , J. (2005). Has ICT come of age? Recurring debates on the role of ICT in education, 1982–2004. *Research in Science & Technological Education*, *23*(1), 25–39. https://doi.org/10.1080/02635140500068419

Wiles, R., Crow, G., Charles, V., & Heath, S. (2007). Informed consent and the research process: following rules or striking balances?. *Sociological Research Online*, *12*(2), 99–110. https://doi.org/10.5153/sro.1208

Xodabande, I. (2017). The effectiveness of social media network telegram in teaching English language pronunciation to Iranian EFL learners. *Cogent education*, *4*(1), https://doi.org/10.1080/2331186X.2017.1347081

Yang, J. (2013). Mobile assisted language learning: review of the recent applications of emerging mobile technologies. *English Language Teaching*, *6*(7), 19–25. http://dx.doi.org/10.5539/elt.v6n7p19

Zutlevics, T. L. (2016). Could providing financial incentives to research participants be ultimately self-defeating?. *Research Ethics*, *12*(3), 137–148. https://doi.org/10.1177/1747016115626756

Appendix A Online Questionnaire

Dear participants,

You are sincerely invited to participate in research conducted by Wenjin Wang, who is a Master's student from the Department of Education at the University of Oxford. This research is being completed under the supervision of Professor Rebecca Eynon. The aim of this research is to understand Hong Kong pre-service English as a foreign language teachers' self-efficacy in technology integration into their future classrooms. You have been invited to participate as you are enrolled in an English Language or/and language studies programme and have at least two weeks of teaching practicum in Hong Kong. You may ask any questions before deciding to take part by contacting the researcher. Please read through this information before agreeing to participate.

This online survey contains 2 sections, which should take less than 10 minutes to finish:

1. Section A collects your background information to help the researcher analyse research data and identify participants for a follow-up interview.
2. Section B has 32 statements associated with your self-efficacy and knowledge of technology integration.

Do I have to take part?

No. Please note that participation is voluntary. If you do decide to take part, you may withdraw at any point for any reason before submitting your answers by pressing the 'Exit' button/closing the browser.

How will my data be used?

Your data will be anonymised and written up in a Master's dissertation. We will take all reasonable measures to ensure that your data remains confidential.

Who will have access to my data?

The University of Oxford is the data controller with respect to your personal data and, as such, will determine how your personal data is used in the research. The university will process your personal data for the purposes of the research outlined above.

Who do I contact if I have a concern or I wish to complain?

If you have a concern about any aspect of this research, please speak to the researcher Wenjin Wang via email at wenjin.wang@kellogg.ox.ac.uk or her supervisor Rebecca Eynon via email at rebecca.eynon@oii.ox.ac.uk, and we will do our best to answer your query.

1. Please note that you may only participate in this survey if you are 18 years of age or over (required, single choice).

o yes

o no

2. If you have read the information above and agree to participate with the understanding that the data (including any personal data) you submit will be processed accordingly, please tick the box below to start (required, single choice).

o yes, I agree

Section 1 About you

3. In this section we would like to know a little bit more about you and your studies. Please complete the following.

4. Your degree year (required, single choice)

o Year one

o Year two

o Year three

o Year four

o Year five

5. Your major (required, single choice)

o BEd (English Language)-Primary focus

o BEd (English Language)-Secondary focus

o BA (Language Studies) & BEd (English Language) - Primary focus

o BA (Language Studies) & BEd (English Language) - Secondary focus

o HKBU BA (English Language and Literature) & BEd

6. The level of school you taught during block practice/field experience (required, single choice)

o Primary level

o Secondary level

o Both primary level and secondary level

7. The length of block practice/field experience to date?

o over two weeks but haven't finished six weeks' block practice

o finished six weeks' block practice but haven't finished 16 weeks' field experience

o finished both block practice and field experience

o HKBU: finished two months' teaching practicum in Year four

o HKBU: finished both teaching practicums in Year four & five

8. What kind of digital technologies or software applications have you used during your teaching practicum? (required, multiple choice)

o Hardware (e.g., computers, laptops, handhelds, whiteboards, etc.)

o Interactive or game-based learning platforms (e.g., Kahoot!, NearPod, etc.)

o Discussion platforms (e.g., Padlet, wordcloud, etc.)

o Microsoft and Google applications (e.g., Word, PowerPoint, Google Docs, etc.)

o Social media applications (e.g., Whatsapp, Facebook, Instagram, etc.)

o E-book platform (e.g., book creator, etc.)

o Learning management system (e.g., Canvas, Moodle, etc.)

o other

o I never used any of them.

9. Your email address: _____(required, text response).

10. Your gender (required, single choice)

o Man

o Woman

o Non-binary

o Prefer not to answer

Section 2 Feelings about Technology Integration

In this section, we would like to ask you questions about how you feel about integrating technology into your teaching. For each statement below, please indicate the strength of your agreement or disagreement by ticking one of the five scales (i.e., Strongly Agree = SA; Agree = A; Neither Agree/Disagree = NA/ND; Disagree = D; Strongly Disagree = SD).

Statement	**SD: Strongly Disagree**	**D: Disagree**	**NA/ND: Neither Agree nor Disagree**	**A: Agree**	**SA: Strongly Agree**
I feel confident that I understand computer capabilities well enough to maximize them in my classroom.	SD	D	NA/ND	A	SA
2. I feel confident that I have the skills necessary to use the computer for instruction.	SD	D	NA/ND	A	SA
3. I feel confident that I can successfully teach relevant subject content with appropriate use of technology.	SD	D	NA/ND	A	SA
4. I feel confident in my ability to evaluate software for teaching and learning.	SD	D	NA/ND	A	SA
5. I feel confident that I can use correct computer terminology when directing	SD	D	NA/ND	A	SA

students' computer use.					
6. I feel confident I can help students when they have difficulty with the computer.	SD	D	NA/ND	A	SA
7. I feel confident I can effectively monitor students' computer use for project development in my classroom.	SD	D	NA/ND	A	SA
8. I feel confident that I can motivate my students to participate in technology-based projects.	SD	D	NA/ND	A	SA
9. I feel confident I can mentor students in appropriate uses of technology.	SD	D	NA/ND	A	SA
10. I feel confident I can consistently use educational technology in effective ways.	SD	D	NA/ND	A	SA
11. I feel confident I can provide individual feedback to students during technology use.	SD	D	NA/ND	A	SA
12. I feel confident I can regularly incorporate technology into my lessons, when appropriate to student learning.	SD	D	NA/ND	A	SA
13. I feel confident about selecting appropriate technology for instruction based on curriculum standards.	SD	D	NA/ND	A	SA
14. I feel confident about assigning and grading technology-based projects.	SD	D	NA/ND	A	SA
15. I feel confident about keeping curricular goals and technology uses in mind when selecting an ideal way to assess student learning.	SD	D	NA/ND	A	SA
16. I feel confident about using technology resources (such as spreadsheets, electronic portfolios, etc.) to collect and analyze data from: student tests and products to improve instructional practices.	SD	D	NA/ND	A	SA

Section 3 Knowledge of Teaching EFL with Technologies

In this section, we would like to know more about the knowledge you have about using technology for EFL teaching. For each statement below, please indicate the strength of your agreement or disagreement by ticking one of the five scales (i.e., Strongly Agree = SA; Agree = A; Neither Agree/Disagree = NA/ND; Disagree = D; Strongly Disagree = SD).

Technological Knowledge (TK)	**SD: Strongly Disagree**	**D: Disagree**	**NA/ND: Neither Agree nor Disagree**	**A: Agree**	**SA: Strongly Agree**
1. I can use basic technological terms (e.g. operating system, wireless connection, virtual memory, etc.) appropriately.	SD	D	NA/ND	A	SA
2. I can adjust computer settings such as installing software and establishing an Internet connection.	SD	D	NA/ND	A	SA
3. I can use computer peripherals such as a printer, a headphone, and a scanner.	SD	D	NA/ND	A	SA
4. I can troubleshoot common computer problems (e.g. printer problems, Internet connection problems, etc.) independently.	SD	D	NA/ND	A	SA
5. I can use digital classroom equipment such as projectors and smart boards.	SD	D	NA/ND	A	SA
6. I can use Office programs (i.e. Word, PowerPoint, etc.) with a high level of proficiency.	SD	D	NA/ND	A	SA
7. I can create multimedia (e.g. video, web pages, etc.) using text, pictures, sound, video, and animation.	SD	D	NA/ND	A	SA
8. I can use collaboration tools (wiki, edmodo, 3D virtual environments, etc.) in accordance with my objectives.	SD	D	NA/ND	A	SA
9. I can learn software that helps me complete a variety of tasks more efficiently.	SD	D	NA/ND	A	SA

Technological content knowledge (TCK)	**SD: Strongly Disagree**	**D: Disagree**	**NA/ND: Neither Agree nor Disagree**	**A: Agree**	**SA: Strongly Agree**
10. I can take advantage of multimedia (e.g. video, slideshow, etc.) to express my ideas about various topics in English.	SD	D	NA/ND	A	SA
11. I can benefit from using technology (e.g. web conferencing and discussion forums) to contribute at a distance to multilingual communities.	SD	D	NA/ND	A	SA
12. I can use collaboration tools to work collaboratively with foreign persons (e.g. Second Life, wiki, etc.).	SD	D	NA/ND	A	SA

Technological pedagogical knowledge (TPK)	**SD: Strongly Disagree**	**D: Disagree**	**NA/ND: Neither Agree nor Disagree**	**A: Agree**	**SA: Strongly Agree**
13. I can meet students' individualized needs by using information technologies.	SD	D	NA/ND	A	SA
14. I can lead students to use information technologies legally, ethically, safely, and with respect to copyrights.	SD	D	NA/ND	A	SA
15. I can support students as they use technology such as virtual discussion platforms to develop their higher order thinking abilities.	SD	D	NA/ND	A	SA
16. I can manage the classroom learning environment while using technology in the class.	SD	D	NA/ND	A	SA

17. I can decide when technology would benefit my teaching of specific English curricular standards.	SD	D	NA/ND	A	SA
18. I can design learning materials by using technology that supports students' language learning.	SD	D	NA/ND	A	SA
19. I can use multimedia such as videos and websites to support students' language learning.	SD	D	NA/ND	A	SA

Technological pedagogical content knowledge (TPACK)	**SD: Strongly Disagree**	**D: Disagree**	**NA/ND: Neither Agree nor Disagree**	**A: Agree**	**SA: Strongly Agree**
20. I can use collaboration tools (e.g. wiki, 3D virtual environments, etc.) to support students' language learning.	SD	D	NA/ND	A	SA
21. I can support students as they use technology to support their development of language skills in an independent manner.	SD	D	NA/ND	A	SA
22. I can use Web 2.0 tools (animation tools, digital story tools, etc.) to develop students' language skills.	SD	D	NA/ND	A	SA
23. I can support my professional development by using technological tools and resources to continuously improve the language teaching process.	SD	D	NA/ND	A	SA

Thank you so much for your participation in the survey! You are also sincerely invited to participate in a follow-up online interview. The interview should take approximately 30-45 minutes. You can speak Mandarin or English during the interview, and you can ask to pause or stop the interview at any time. We appreciate your interest in taking part in the interview and will reward you HK $40 (or RMB 35 if you wish) after finishing the interview.

Please leave you contact number if you wish to participate. I am looking forward to your participation!

_____ (optional, text response).

Appendix B Interview Protocols

Part I. Interview Protocol Related to Self-efficacy

Item	Interview Protocol (Chinese-English Translated Version)	Sources of Self-efficacy
1	Can you elaborate on what digital technologies and tools you employed during your teaching placement and how you learned to become proficient in using them?	Mastery experiences
2	In what ways has your previous experience teaching EFL with technology influenced your confidence in integrating technology into your future classes?	Mastery experiences
3	How have the successes or failures of your peers' experiences with digital technologies or tools impacted your confidence in integrating technology into your EFL class?	Vicarious experiences
4	How have other people encouraged you to use digital technologies or tools in your EFL class?	Verbal persuasion
5	How have your students' responses to the use of digital technologies or tools for EFL teaching affected your confidence in integrating technology into your class?	Verbal persuasion or physiological and affective states
6	What were your physiological and affective states when you integrated digital technologies and tools into your EFL class?	Physiological and affective states
7	What challenges, if any, have you faced when incorporating digital technologies or tools into your EFL teaching?	Questions that may be relevant to any of the four sources of self-efficacy

Part II. Interview Protocol Related to TPACK

Item	Interview Protocol (Chinese-English Translated Version)	TPACK
1	How do you determine which digital technologies or tools are suitable for EFL teaching?	TK

2	If applicable, how do you utilise technology to develop new teaching methods? Could you elaborate on your approach?	TPK
3	Could you provide a specific example of how you use a particular digital software or tool to accomplish teaching objectives?	TCK
4	How do you perceive the relationship between the digital tools and technologies you use and the content of your teaching (listening, speaking, reading, and writing) and teaching methods?	TPACK
5	In comparison to traditional classroom teaching, what do you believe are the advantages and disadvantages of incorporating digital technology and tools in achieving EFL teaching goals?	Questions that may be relevant to any of the TPACK components

Part III. Order of Interview Questions

1. Can you elaborate on what digital technologies and tools you employed during your teaching placement and how you learned to become proficient in using them?
2. Could you provide a specific example of how you use a particular digital software or tool to accomplish teaching objectives?
3. How do you determine which digital technologies or tools are suitable for EFL teaching?
4. How do you perceive the relationship between the digital tools and technologies you use and the content of your teaching (listening, speaking, reading, and writing) and teaching methods?
5. If applicable, how do you utilise technology to develop new teaching methods? Could you elaborate on your approach?
6. In comparison to traditional classroom teaching, what do you believe are the advantages and disadvantages of incorporating digital technology and tools in achieving EFL teaching goals?
7. In what ways has your previous experience teaching EFL with technology influenced your confidence in integrating technology into your future classes?
8. How have the successes or failures of your peers' experiences with digital technologies or tools impacted your confidence in integrating technology into your EFL class?
9. How have other people encouraged you to use digital technologies or tools in your EFL class?
10. How have your students' responses to the use of digital technologies or tools for EFL teaching affected your confidence in integrating technology into your class?
11. What were your physiological and affective states when you integrated digital technologies and tools into your EFL class?

12. What challenges, if any, have you faced when incorporating digital technologies or tools into your EFL teaching?

Appendix C Ethical Approval

SOCIAL SCIENCES & HUMANITIES
INTERDIVISIONAL RESEARCH ETHICS COMMITTEE
DEPARTMENTAL RESEARCH ETHICS COMMITTEE

Department of Education
15 Norham Gardens, Oxford OX2 6PY
student.curec@education.ox.ac.uk; staff.curec@education.ox.ac.uk
Wenjin Wang

Department of Education, Social Sciences Division
University of Oxford 26 April 2023

Dear Wenjin,

Research ethics approval

Research title: Hong Kong EFL Pre-service Teachers' Readiness for Technology Integration into Future Teaching Practices: An Explanatory Sequential Mixed Methods Study

Research ethics reference: EDUC_C1A_23_132

The above application has been considered on behalf of the Education Departmental Research Ethics Committee (DREC) in accordance with the University's procedures for ethical approval of all research involving human participants.

I am pleased to confirm that, on the basis of the information provided to the DREC, ethics approval has now been granted for this study.

Please note the following:
Personal data: It is the responsibility of the PI to ensure that all personal data collected during the project is managed in accordance with the University's guidance and legal requirements.

In-person activities: Any data collection involving in-person interactions with participants must have an up-to-date fieldwork risk assessment in place; further guidance is available from the Safety Office's website.

Amendments: Please notify the committee if you intend to make any amendments to the information in your ethics application as submitted at date of this approval, as all changes must receive ethical approval prior to implementation. The amendment form is available on the SSH IDREC webpage.

We welcome feedback on your experience of the ethical review process and suggestions for improvement. Please email any comments to staff.curec@education.ox.ac.uk / student.curec@education.ox.ac.uk or ethics@socsci.ox.ac.uk.

Yours sincerely
Aliya Khalid
DREC member
cc: Rebecca Eynon, rebecca.eynon@oii.ox.ac.uk

Appendix D Interview Information Sheet

Central University Research Ethics Committee Approval Reference: [EDUC_C1A_23_132]

You are sincerely invited to participate in research conducted by Wenjin Wang, who is a Master's student from the Department of Education at the University of Oxford. This research is being completed under the supervision of Professor Rebecca Eynon. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

Why is this research being conducted?

The researcher is interested in exploring the readiness of Hong Kong EFL pre-service teachers to integrate technology into their future teaching practices. Specifically, the researcher is curious about the extent to which these teachers are prepared to use digital tools and resources in their future classrooms, and what factors may be influencing their readiness or lack thereof. This research aims to explore the types of digital tools and resources that they have been exposed to, the extent to which they have had opportunities to practice using these tools in the classroom, and any challenges or barriers that may be hindering their ability to effectively integrate technology into their teaching practices. By examining this topic, this research hopes to shed light on how the experiences and training of these teachers influence their self-efficacy in integrating technologies into their future classrooms and to identify areas where further support and development may be needed.

Why have I been invited to take part?

You have been invited to participate as you are enrolled in English Language or/and language studies programme and have at least two weeks of teaching practicum in Hong Kong local schools.

Do I have to take part?

No. It is up to you to decide whether to take part. You can withdraw yourself from the research, without giving a reason or negative consequences. The deadline by which you can withdraw any information you have provided for the interviews is 30 May, 2023 as after this date your information will be coded with other interviewees' information for the thematic analysis and the researcher would not be able to identify or withdraw your information.

What will happen to me if I take part in the research?

By agreeing to participate in the study, you will be taking part in an interview that will last approximately 30-45 minutes. During the interview, we would like you to share your past experiences of integrating technologies into your EFL classes in local schools in Hong Kong, as well as any technology-related training you may have received in teacher training programs.

The interview will be conducted online via Microsoft Teams. Both the researcher and the interviewer will mutually agree on a convenient time that works for both parties. You can speak Mandarin or English during the interview and can ask to pause or stop the interview at any time. If you are happy to take part, you will be asked to e-sign a consent form and send back to the researcher email: wenjin.wang@kellogg.ox.ac.uk. With your consent, we would like to audio record you for the convenience of transcription.

We appreciate your interest in taking part in the interview and will reward you HK $40 (or RMB 35 if you wish) after finishing the interview.

What are the possible disadvantages and risks in taking part?

There are no significant risks (physically, psychological, mental) expected to arise from taking part in the study. If you ever feel uncomfortable during the interview, you can ask the researcher to pause or stop the interview.

Are there any benefits in taking part?

While there are no immediate benefits to you from taking part in this research, it is hoped that this research will help you reflect upon your past teaching experiences and encourage you to think about how technology can be effectively integrated into your future classroom.

What happens to the data provided?

Your audio recordings and transcripts will be given code numbers.

The researcher will kindly request your consent to use your direct quotes, anonymised under a pseudonym, in her dissertation.

The information you provide during the study is the research data. Any research data from which you might be identified (gender/major/year of study/school level you taught/duration of your teaching practicum) is known as personal data.

All the research data, including personal data, consent forms, audio recordings, transcripts, will be stored confidentially in the researcher's Nexus 364 OneDrive for Business account for the duration of the study and will be transferred to her supervisor's OneDrive account after the completion of the research.

Both the researcher and her supervisor will have access to the research data derived from the study. Responsible members of the University of Oxford may be given access to data for monitoring and/or audit of the research. All research data and records will be stored for 3 years after publication or public release of the work of the research.

Will the research be published?

Yes. The findings from the research will be written up as a Master's dissertation. On successful submission of the dissertation, it will be deposited both in print and online in the University archives, to facilitate its use in future research. The dissertation will be openly accessible.

Data Protection

The University of Oxford is the data controller with respect to your personal data, and as such will determine how your personal data is used in the research. The University will process your personal data for the purpose of the research outlined above. Research is a task that is performed in the public interest. Further information about your rights with respect to your personal data is available from the University's Information Compliance web site at https://compliance.admin.ox.ac.uk/individual-rights.

Who has reviewed this research?

This research has received ethics approval from a subcommittee of the University of Oxford Central University Research Ethics Committee. (Ethics reference: EDUC_C1A_23_132).

Who do I contact if I have a concern about the research or I wish to complain?

If you have a concern about any aspect of this research, please speak to the researcher Wenjin Wang via email wenjin.wang@kellogg.ox.ac.uk or her supervisor Rebecca Eynon via email rebecca.eynon@oii.ox.ac.uk, and we will do our best to answer your query. We will acknowledge your concern within 10 working days and give you an indication of how it will be dealt with. If you remain unhappy or wish to make a formal complaint, please contact the Chair of the Research Ethics Committee at the University of Oxford who will seek to resolve the matter as soon as possible:

Social Sciences & Humanities Interdivisional Research Ethics Committee; Email: ethics@socsci.ox.ac.uk; Address: Research Services, University of Oxford, Boundary Brook House, Churchill Drive, Headington, Oxford OX3 7GB.

Further Information and Contact Details

If you would like to discuss the research with someone beforehand (or if you have questions afterwards), please contact:

Name: Wenjin Wang

Address: Department of Education 15 Norham Gardens, Oxford, OX2 6PY

TEL: +44 7529790831

Email: wenjin.wang@kellogg.ox.ac.uk.

Appendix E Interview Consent Form

Central University Research Ethics Committee Approval Reference: [EDUC_C1A_23_132]

Please read the statements below. If you are happy with all of the statements, please copy and paste them into an email and send it to me at wenjin.wang@kellogg.ox.ac.uk. This will be considered to constitute giving your consent to participate in the interview.

If you have any questions about the research or the statements below, please do not hesitate to contact me.

I confirm that I have read and understand the information sheet for the study: Hong Kong EFL Pre-service Teachers' Readiness for Technology Integration into Future Teaching Practices: An Explanatory Sequential Mixed Methods Study.

I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

I understand that my participation is voluntary and that I can withdraw from the interview at any time during the interview without any adverse consequences or penalty. I understand that I cannot withdraw my interview data after 30 May, 2023 as they will be coded and written up in the thesis by the researcher.

I understand what will happen to my data.

I give the researcher permission to interview and audio record me.

I give permission for the researcher to quote me directly using a pseudonym.

I give permission for the researcher to re-contact me to clarify information.

I understand how to raise a concern or make a complaint.

I am happy to take part in the research.

Appendix F Ranking of Survey Statements

The Ranking of Statements Related to EFL Pre-service Teachers' Self-efficacy and TPACK in Descending Order(n = 40)

Item number	Statement	Mean	Related to Self-efficacy/TPACK
22	I can use Office programs (i.e. Word, PowerPoint, etc.) with a high level of proficiency.	4.33	TK
27	I can benefit from using technology (e.g. web conferencing and discussion forums) to contribute at a distance to multilingual communities.	4.30	TCK
21	I can use digital classroom equipment such as projectors and smart boards.	4.28	TK
26	I can take advantage of multimedia (e.g. video, slideshow, etc.) to express my ideas about various topics in English.	4.28	TCK
2	I feel confident that I have the skills necessary to use the computer for instruction.	4.23	Self-efficacy in TK
8	I feel confident that I can motivate my students to participate in technology-based projects.	4.15	Self-efficacy in TPK
18	I can adjust computer settings such as installing software and establishing an Internet connection.	4.13	TK
25	I can learn software that helps me complete a variety of tasks more efficiently.	4.13	TK
35	I can use multimedia such as videos and websites to support students' language learning.	4.13	TPK
1	I feel confident that I understand computer capabilities well enough to maximize them in my classroom.	4.08	Self-efficacy in TK
23	I can create multimedia (e.g. video, web pages, etc.) using text, pictures, sound, video, and animation.	4.08	TK
34	I can design learning materials by using technology that supports students' language learning.	4.08	TPK

12	I feel confident I can regularly incorporate technology into my lessons, when appropriate to student learning.	4.05	Self-efficacy in TCK
14	I feel confident about assigning and grading technology-based projects.	4.03	Self-efficacy in TCK
17	I can use basic technological terms (e.g. operating system, wireless connection, virtual memory, etc.) appropriately.	4.03	TK
3	I feel confident that I can successfully teach relevant subject content with appropriate use of technology.	4.00	Self-efficacy in TCK
4	I feel confident in my ability to evaluate software for teaching and learning.	3.95	Self-efficacy in TPK
15	I feel confident about keeping curricular goals and technology uses in mind when selecting an ideal way to assess student learning.	3.95	Self-efficacy in TCK
33	I can decide when technology would benefit my teaching of specific English curricular standards.	3.95	TPK
19	I can use computer peripherals such as a printer, a headphone, and a scanner.	3.95	TK
31	I can support students as they use technology such as virtual discussion platforms to develop their higher order thinking abilities.	3.93	TPK
39	I can support my professional development by using technological tools and resources to continuously improve the language teaching process.	3.90	TPACK
13	I feel confident about selecting appropriate technology for instruction based on curriculum standards.	3.90	Self-efficacy in TPACK
38	I can use Web 2.0 tools (animation tools, digital story tools, etc.) to develop students' language skills.	3.90	TPACK
10	I feel confident I can consistently use educational technology in effective ways.	3.88	Self-efficacy in TPACK

5	I feel confident that I can use correct computer terminology when directing students' computer use.	3.85	Self-efficacy in TK
28	I can use collaboration tools to work collaboratively with foreign persons (e.g. Second Life, wiki, etc.).	3.85	TCK
37	I can support students as they use technology to support their development of language skills in an independent manner.	3.85	TPACK
11	I feel confident I can provide individual feedback to students during technology use.	3.80	Self-efficacy in TCK
16	I feel confident about using technology resources (such as spreadsheets, electronic portfolios, etc.) to collect and analyze data from: student tests and products to improve instructional practices.	3.80	Self-efficacy in TPACK
29	I can meet students' individualized needs by using information technologies.	3.78	TPK
9	I feel confident I can mentor students in appropriate uses of technology.	3.73	Self-efficacy in TK
32	I can manage the classroom learning environment while using technology in the class.	3.73	TPK
7	I feel confident I can effectively monitor students' computer use for project development in my classroom.	3.70	Self-efficacy in TPK
30	I can lead students to use information technologies legally, ethically, safely, and with respect to copyrights.	3.70	TPK
6	I feel confident I can help students when they have difficulty with the computer.	3.68	Self-efficacy in TK
36	I can use collaboration tools (e.g. wiki, 3D virtual environments, etc.) to support students' language learning.	3.45	TPACK
20	I can troubleshoot common computer problems (e.g. printer problems, Internet connection problems, etc.) independently.	3.43	TK
24	I can use collaboration tools (wiki, edmodo, 3D virtual environments, etc.) in accordance with my objectives.	3.25	TK

Note. The item numbers are based on the sequence of the statements in the online questionnaire. The overall mean of these 39 items was 3.93.