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Exploring Primary School Teacher Perceptions and Practices Integrating Technology in a Chinese EFL Context

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Abstract

Recent Chinese educational policies have increasingly emphasised the use and integration of digital technologies, placing expectations on teachers to incorporate technology into their teaching practices. This study explores how English as a Foreign Language (EFL) teachers in Chinese primary schools perceive and use technology, as well as the factors influencing their technology use.

Employing a qualitative dominant mixed-methods design, data were collected from an online questionnaire ($n = 244$) and case studies of three primary schools (two public and one private) in Hangzhou, China. The case studies consisted of two semi-structured interviews with five teachers in each of the schools as well as a review of teaching plans and classroom observations. Survey data were analysed using descriptive statistics while thematic analysis, followed by cross-case analysis, was employed for the case study data. Data across sources were then compared to gain a more comprehensive understanding of the research phenomena.

The survey findings revealed that while teachers generally held positive attitudes toward technology and had shared perceptions of the affordances, perceptions about the constraints were more varied. The case study findings illustrated that teachers used technology to engage and motivate students, scaffold and support learning, and foster skill development. Although teachers across school types shared similarities in their use of technology, public school teachers typically used technology for content delivery, whereas private school teachers utilised technology to support a wider variety of pedagogical purposes, such as cultivating students' autonomy, technological skills, and research skills. Factors contributing to these differences include institutional funding, access to technology, professional development opportunities, curriculum requirements, and assessment pressures. This study also

contributes to the literature by suggesting extensions to technology acceptance models through two novel factors which were found to influence teachers' use of technology: Teacher Autonomy within their Schools (TAws), and the interaction between teaching experience and training recency.

In terms of implications, teachers could be better supported by school leaders, teacher educators and policymakers through providing access to adequate technology infrastructure, and through the provision of differentiated professional development for technological skills and pedagogical integration to encourage greater autonomy and educational innovation.

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As Hermann Hesse once wrote in *Klingsor's Last Summer*: “All waters flow into the sea, all souls flow into the night. But we are all the same, we all come from the same source. We shall find each other again, we shall recognize each other, we shall love each other again, in the great river.”

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List of Abbreviations

EF	Effort Expectancy
EFL	English as a Foreign Language
IWB	Interactive Whiteboard
K-12	Kindergarten to 12th Grade (educational level)
MOE	Ministry of Education
PE	Performance Expectancy
PEOU	Perceived Ease of Use
PPT	PowerPoint
PU	Perceived Usefulness
TAM	Technology Acceptance Model
TPACK	Technological Pedagogical Content Knowledge Model
TPK	Technological Pedagogical Knowledge
TPR	Total Physical Response
UTAUT	The Unified Theory of Acceptance and Use of Technology

Chapter 1 Introduction

1.1 Introduction

This qualitative dominant mixed-methods study investigates Chinese primary school English as a Foreign Language (EFL) teachers' perceptions of using technology in their teaching as well as their reported practices and the factors influencing these practices. This chapter begins with the research background and context. It then describes how the researcher's personal experiences motivated this study. Following this, the problem statement is presented. Subsequently, the chapter discusses the research objectives and the significance of the study for stakeholders. The chapter concludes by outlining the organisation of the thesis.

In this study, the term technology is used to refer specifically to digital technology, which includes a range of tools and platforms such as PowerPoint Presentations (PPT), interactive whiteboards (IWB), laptops, tablets, and various digital resources often available and used for teaching and learning in Chinese primary schools. While the thesis title, aims, and research questions employ the broader term "technology" for conciseness, in alignment with the field's general discourse at the time the data was collected, all references to technology within this thesis refer to digital technology. This focus on digital technology is consistent with current educational technology research within the field of applied linguistics and follows Hubbard (2009) who claims that "technology-mediated instruction" pertains to digital tools and systems. Newer definitions of digital technology extend beyond basic multimedia to include Artificial Intelligence (AI), immersive technologies such as Virtual and Augmented Reality, and mobile technologies (Luckin & Holmes., 2016; UNESCO, 2023). While acknowledging this evolving situation, this study specifically focuses on the established digital technologies most prevalent in Chinese primary EFL contexts during the data collection phase of the study which was undertaken in 2022. AI and

immersive technologies fall outside this study's scope for two reasons: the empirical data collected predate the widespread use of generative AI, and the investigation prioritises the "lived reality" of participating teachers, for whom PPT and IWB represent the predominant technologies used for daily instruction.

In addition to defining the scope of technology, it is necessary to clarify the use of key terminology. Theoretically, "technology adoption" refers to the initial acceptance of tools, while "technology use" denotes the application of technology by teachers in their teaching practice, whereas "technology integration" is where technology and pedagogy are integrated so that there is the purposeful enactment of technology (Ertmer et al., 2012; Tondeur et al., 2017). While theoretical distinctions exist, in the findings chapters of this work, as teachers' perceptions and reported practices often encompassed these stages as a singular, integrated experience, this study prioritises the authentic voices and lived experiences of the participants. In the chapter summaries and discussion chapter, teachers' perceptions and practices are analysed in relation to the theoretical terms.

1.2 Research Background and Context

This section establishes the background and context for the study. It briefly outlines the global context of technology in language education. Then it narrows the focus to the Chinese primary school EFL context, and the research setting in Hangzhou, China.

In recent years, technology has become integral to language education worldwide to enhance and even transform classroom instruction and students' learning experiences (Meniado, 2023). However, the effective integration of technology is a complex phenomenon, often mediated by an interplay of factors including teacher professional development, resource availability, and institutional support (Njiku et al., 2019). This complexity suggests that technology integration outcomes may vary significantly

across different educational contexts, cultures, and pedagogical traditions (Chugh et al., 2023). Since much existing research has been conducted in Western educational settings (Li et al., 2021), which may differ significantly from Chinese contexts in terms of educational culture, pedagogical approaches, and technology infrastructure, there is a need to understand how teachers in the Chinese EFL context perceive and utilise technology.

1.2.1 Chinese Primary School EFL Context

In the 21st century, economic globalisation has made foreign languages, especially English, an important tool for China to engage in international exchanges. At the national level, English competency is regarded as a key factor in maintaining international competitiveness, and it is also seen as a valuable personal skill, offering individuals greater economic, social, and educational opportunities (Qi, 2016).

Recognising these benefits, the Chinese Ministry of Education (MOE, 2000, 2001, 2007) has made English language education a compulsory subject from primary to secondary levels. To further enhance the quality of foreign language education and promote students' cross-cultural awareness and communication, English was officially introduced to the primary school curriculum in China from Grade Three in 2001, and local educational bureaus and individual schools have the flexibility to introduce it even earlier (Hu, 2007; MOE, 2001). This policy initiative has created a learning context of significant scale. According to the latest data, China had 108.36 million primary school students in 2023 (MOE, 2024), likely making it the country with the largest population of primary-level EFL learners worldwide.

The pedagogical approach in primary school English classrooms has evolved significantly over the past decade. Since 2011, the *English Curriculum Standards for Compulsory Education (2011 Edition)*, which serves as the official national curriculum for all primary and junior secondary schools in China, has encouraged teachers to shift from traditional teacher-centred instruction to a student-centred

approach (MOE, 2011). This led to the adoption of more interactive methods, such as task-based learning and the communicative approach, in primary English classrooms (Qi, 2016). The 2022 edition of the curriculum standards, i.e., the *English Curriculum Standards for Compulsory Education (2022 Edition)* (MOE, 2022) (hereafter the 2022 Curriculum Standards) further reinforced this pedagogical shift.

Moving beyond the traditional English for General Purposes (EGP) orientation, the current 2022 Curriculum Standards are structured around the development of students' core competencies, which specifically include language ability, cultural awareness, critical thinking, and learning ability (MOE, 2022). A key feature of the 2022 Curriculum Standards is the strategic role assigned to technology. The 2022 Curriculum Standards require effective use of technology, positioning technology not only as a teaching aid for educators but also as a crucial resource for learners. Furthermore, the 2022 Curriculum Standards advocate integrating digital resources to create rich learning contexts and to promote a variety of learning activities that involve collaboration and inquiry, thereby supporting the continued emphasis on student-centred, interactive approaches to English language learning (MOE, 2022).

However, despite a clear advocacy for communicative approaches in the 2022 Curriculum Standards, empirical evidence reveals a persistent gap between curriculum intentions and classroom realities. Recent studies indicate that many Chinese students continue to struggle with developing strong English communication skills, particularly in productive areas like writing and speaking (Zhou et al., 2022), leading to ongoing concerns about the quality of learning outcomes despite years of English provision (Wang et al., 2020). It has been argued that the dominance of a high-stakes, exam-oriented system, which prioritises test-focused preparation over communication, limits the development of the communicative proficiency as promoted in the 2011 and 2022 Curriculum Standards (Wang et al., 2020; Zhou et al., 2022).

To reduce the impact of the exam-oriented system, MOE (2019) issued a policy, named *Notice on Doing a Good Job in the 2019 Enrolment and Admission Work for General Primary and Secondary School*, which has largely abolished selective entrance exams at the primary-to-junior-high school transition in many cities like Hangzhou. These exams have been replaced with a district-based allocation system, where admission is often determined via a computerised lottery (a random selection process) (MOE, 2019). However, current primary school students still need to take the senior high school entrance exam (*Zhongkao*), and the even more critical national college entrance exam (*Gaokao*), in the future. The intense competition in these exams pressures parents and teachers to start preparing students from a very early age (Zhang & Bray, 2020). Consequently, even without entrance exams, there is immense pressure in primary schools to prioritise subjects and skills foundational for future *Zhongkao* and *Gaokao* success (Zhao, 2014), often at the expense of developing communicative competencies in English.

Within this broader context, it is important to note that in China, the vast majority of primary schools are public, with private primary schools constituting a smaller but important part of the education system (MOE, 2024). Private primary schools made up approximately 3.52% of all primary schools nationwide in 2023 (China Education Research Association, 2024) and enrolled approximately 8.8% of primary school students in 2022 (Trading Economics, 2025). Unlike their public counterparts, private primary schools typically introduce English education from Grade One, earlier than the national curriculum's requirement of Grade Three. At the national policy level, the *Implementation Regulations of the Private Education Promotion Law of the People's Republic of China* provides the legal framework for private education (State Council, 2021). Under this regulation, private schools have greater autonomy to design their English curricula, set educational objectives, and select textbooks, whereas public schools do not have such flexibility. However, private schools still need to ensure

their students meet the core competencies outlined in the national curriculum standards. This flexibility allows private schools to schedule additional English lessons based on their specific needs, with arrangements varying across institutions.

In developed regions such as Hangzhou, private schools often integrate international curricula, such as elements of the International Baccalaureate, with the national curriculum to create a hybrid model, as permitted by the regional education bureau. This international orientation has significant implications, as students at these schools often pursue higher education abroad, which allows them to bypass the national exam system and experience less acute pressure from exams (Wright et al., 2024).

1.2.2 Technology Integration in Chinese Schools

The promotion of educational technologies in China is strongly supported by national strategic plans. The *China Education Modernization 2035 plan*, for instance, sets a long-term strategic vision for transforming the entire education system through technological innovation (State Council, 2019). This broad vision is operationalised by the *Education Informatization 2.0 Action Plan*, a more specific initiative designed to promote the deep integration of technology within teaching and learning at all educational levels (MOE, 2018).

The implementation of these policies has been supported by significant government investment in technology infrastructure and the development of online educational resources. As a result, the number of technological devices installed and used in Chinese schools has steadily increased. By 2023, the internet access rate for schools at all levels reached 100%, with over three-quarters of schools achieving wireless network coverage, and 99.5% of schools having multimedia classrooms (China National Academy of Educational Sciences, 2024). Complementing this infrastructure development, the MOE launched the National Smart Education Public Service Platform to provide free, high-quality digital resources, with the platform now

offering more than 44,000 resources for primary and secondary schools (China National Academy of Educational Sciences, 2024).

Chinese schools have also increasingly adopted various digital tools for teachers' pedagogical needs (Zeng, 2022). For instance, studies indicate that interactive whiteboards (IWBs) have become ubiquitous in both primary and secondary schools in China (Hao, 2017; Liu, 2021). These tools are widely used in classrooms to integrate multimedia resources and interactive activities, aiming to foster greater student engagement, interactivity, and collaboration (Hao, 2017; Liu, 2021). Additionally, pilot programs have been launched in several schools, introducing e-schoolbags (tablets integrated with specific digital textbooks and learning platforms) and other tablet devices, with the aim of enabling teachers to facilitate more dynamic and student-centred teaching practices (Liu et al., 2018; Lun & Wang, 2019). This widespread adoption of digital tools reflects the 2022 Curriculum Standards' promotion and recommendation for technology integrated instruction, demonstrating a shift towards utilising digital tools to transform traditional teaching methods (MOE, 2022). This shift aligns with national goals to strengthen the "cultivation of core competencies" as outlined in the *China Education Modernization 2035 Plan* (State Council, 2019, p. 17).

Equally critical to deploying advanced infrastructure and tools is the national emphasis on building teacher capacity to leverage this technology effectively. Recent national policy initiatives place a strong emphasis on cultivating teachers' digital literacy, which is seen as a comprehensive competency extending beyond basic technological skills to also include critical thinking and innovative use of digital tools in classroom environments (MOE, 2022). This strategic priority is being actively implemented through key initiatives, such as the *New Era Basic Education Strong Teacher Plan* (MOE, 2022) and the revised *National Primary and Secondary School Teachers' Information Technology Application Capacity Enhancement Project 2.0*

(MOE, 2019). These programs are designed to train teachers across all subjects to integrate digital tools effectively, to address challenges such as initial resistance that teachers may encounter (Mei et al., 2018), and to emphasise pedagogical innovation, encouraging a shift toward more student-centred methods (MOE, 2022).

This national promotion of technology adoption and use in teaching is also reflected in local contexts such as the research setting in this study, Hangzhou, where the widespread adoption of technologies is accompanied by targeted technological training (Hangzhou Municipal Education Bureau, 2018, 2023). By setting standards at the national level and fostering the culture of professional development locally, these coordinated efforts are designed to strengthen the capacity of Chinese teachers to leverage technology for educational excellence.

Together, these efforts, from policy mandates and infrastructure development to teacher training and deployment of technological tools, demonstrate China's attempts at a systematic approach to educational technology integration, one that aligns with the pedagogical transformation goal envisioned in the *Education Modernization 2035 Plan*.

Within this broader context of integrating technology into education, as noted earlier in Section 1.2.1, the 2022 Curriculum Standards also promote technology integration in English instruction. The updated standards encourage teachers to “make reasonable and innovative use of digital technologies and online teaching platforms” (MOE, 2022, p. 3) and create authentic language environments through multimedia resources, with the broader goal of “deepening the integration of information technology with English lessons” and “promoting transformation of educational concepts and teaching methods” (MOE, 2022, p. 52). These requirements emphasise technology's role not only as a teaching tool but as a catalyst for pedagogical transformation towards more student-centred approaches in school EFL education.

However, while the 2022 Curriculum Standards highlight the importance of technology integration to enhance teaching as well as to transform teaching approaches, practical guidance regarding technology use remains relatively broad and general in nature. Currently, the 2022 Curriculum Standards focus more on the mastery of subject knowledge and learning standards. In addition, the teaching examples provided to support the 2022 Curriculum Standards, feature basic multimedia elements such as static images, audio clips, and video content, rather than more interactive or sophisticated digital tools, such as online collaborative platforms, or interactive assessment tools (MOE, 2022). This reflects that while technology is emphasised at the policy level, the 2022 Curriculum Standards lack specific and practical guidance for EFL teachers to adopt, use and integrate more advanced technology in their teaching.

Given the lack of specific guidance, although all of China's public primary schools follow a standardised national curriculum, it has been argued that EFL teachers' approaches to integrating technology are highly dependent on contextual factors rather than explicit curricular directives (e.g., Cao & Omar, 2023; Huang et al., 2019). However, the extent to which these perceptions and practices vary across different schools remains under-researched. Factors such as the availability of technological resources, access to professional development, and the school administrators' attitudes likely influence EFL teachers' approaches. This contextual variability highlights a need to study the perceptions and use of technology by Chinese primary school EFL teachers in different school settings, including in private schools given the autonomy teachers in these schools have to design their English curricula.

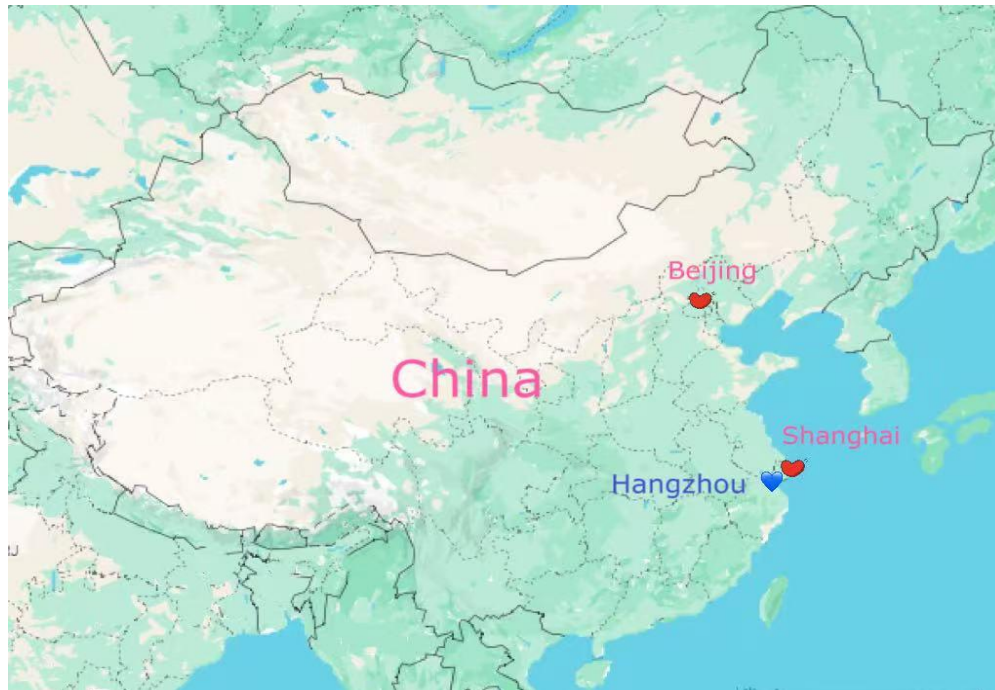
1.2.3 Research Location

This study is situated in Hangzhou, Zhejiang Province, China (see Figure 1.1). Hangzhou is a vibrant and economically developed city in southeast China with a

population of around 12 million. It comprises 10 districts and three counties¹ (see Figure 1.2).

Figure 1.1

A Map Showing Hangzhou's Location in China



Note: The blue heart symbol indicates the location of Hangzhou. The red hearts indicate the reference cities of Beijing and Shanghai. Adapted from *Google Maps*, by Google, n.d. (<https://www.google.com/maps>). Copyright 2025 by Google.

¹ In the Chinese administrative system, a county is typically a subdivision below and administered by a city.

Figure 1.2

An Administrative Map of Hangzhou



Note: A Map showing Hangzhou’s Districts. Adapted from *Baidu Maps*, by Baidu, n.d. (<https://map.baidu.com>). Copyright 2025 by Baidu.

The research focuses on primary school EFL teachers in Hangzhou, a city with approximately 515 primary schools and 2,600 EFL teachers (Hangzhou Municipal Education Bureau, 2024). Conducting the study in Hangzhou is particularly advantageous due to the researcher’s residence in the city, which facilitates access to schools and face-to-face interactions with participants. Hangzhou’s urban setting also ensures a high level of digital infrastructure. As an economically developed city, Hangzhou has attracted investments, which in turn, provide rich resources to support new technology development and related sectors’ growth. This environment allows for a focused examination of pedagogical and attitudinal factors influencing technology integration, minimising infrastructure-related barriers that might otherwise confound the findings.

This study involves a survey of teachers across different regions in Hangzhou (N=244), before focusing on three local schools as case studies. For the case study component, three schools (two public and one private) were purposefully selected for their contrasting characteristics. This diversity enriches the study by providing varied perspectives on how technology is perceived and implemented by EFL teachers in these different contexts, which contributes to a more exploratory understanding of technology use in EFL teaching within Hangzhou's educational landscape.

1.3 Personal Motivation

My interest in this research topic is deeply rooted in my firsthand experience as a primary school EFL teacher in China. During that period, I wanted to make my classes both engaging and educational for my students, so I spent considerable time creating visually appealing PPT slides with sophisticated effects and carefully selected images and videos to enhance learning. In addition, our school's courseware (digital learning materials accompanying the textbook) featured multimodal materials for vocabulary, reading, writing, and listening lessons that students genuinely enjoyed. Furthermore, the built-in digital games in the courseware were particularly popular among students.

However, despite having access to technology, I found that the interactions in my class, apart from digital games, often relied on non-technological methods, with technology serving primarily as a prompt to support interactive activities.

Additionally, I discovered that many of the built-in tools on Seewo IWBs (a popular brand of interactive whiteboard used in Chinese schools), such as the annotation features, remained unused because the training I received didn't cover these functionalities. This gap between available technological resources and my actual usage sparked my curiosity about how technology could better facilitate interactive classroom activities.

At that time, we were using an English textbook series from the United States. While students demonstrated dedication to their studies, they consistently found the material challenging, particularly when they needed to apply what they had learned in speaking and writing tasks. As a primary school teacher, I was eager to discover more effective ways to support my students' learning and wondered specifically how technology could help me achieve this goal.

Consequently, this experience of recognising both the potential and challenges of using technology, combined with my desire to better serve my students' learning needs, fostered my deep interest in integrating technology into primary school English instruction. This also sparked my curiosity about whether other Chinese primary school EFL teachers faced similar challenges, how they integrate technology in their teaching, and why they use technology in a certain way.

1.4 Problem Statement

As mentioned in Section 1.2, China has strategically emphasised educational technology through policies such as the *Education Informatization 2.0 Action Plan* (MOE, 2018), and the *National Primary and Secondary School Teachers' Information Technology Application Capacity Enhancement Project 2.0* (MOE, 2019).

Additionally, the 2022 Curriculum Standards encourage teachers to utilise rich resources to create positive learning situations and to use digital technology in innovative ways. However, despite these policy initiatives, studies have found that technology in primary school EFL classrooms remains under-utilised and that practices are predominantly teacher-centred (Mei et al., 2018; Teo et al., 2018). For example, research indicates that Chinese EFL teachers tend to use technology primarily as a presentation tool due to cultural norms favouring exam-oriented, teacher-centred practices (Xu, 2010; Li & Walsh, 2011; Li & Ni, 2012). This gap between policy expectations and classroom practice highlights the need to investigate

teachers' perceptions and practices to understand why technology is not being fully utilised to enhance EFL instruction.

According to the literature, a significant barrier to effective technology integration is the lack of teacher competency and confidence, compounded by inadequate training tailored to pedagogical needs (Teo et al., 2018; Sun & Mei, 2022; Chen, 2022).

Systemic challenges, such as large class sizes, limited administrative support, and exam-driven curriculum, have also been found to reinforce teacher-centred pedagogies, hindering the shift toward student-centred, technology-mediated learning (Zhu, 2010; Paul & Liu, 2018). This underscores the need to examine the factors that support or impede teachers' use of technology in primary school EFL settings.

Additionally, while technology, such as IWBs, is widely installed in Chinese schools (Hao, 2017; Liu, 2021), the ways in which teachers perceive and use the available technology warrants further investigation.

Existing research on Chinese primary school EFL teachers' technology integration is limited, particularly in providing a holistic understanding of their perceptions, actual classroom practices, and the affordances and constraints teachers encounter (Li, 2014; Chen et al., 2019). Compared to Western educational contexts, studies in China are limited, with only a few exploring the interplay of teachers' attitudes, pedagogical choices, and external influences (Li & Ni, 2011; Bai & Lo, 2018). This research gap calls for a more exploratory study to address how Chinese primary school EFL teachers perceive and implement technology, and what factors shape their practices, to inform professional development and policy interventions that enhance technology-mediated EFL teaching. Addressing this gap will contribute to both theoretical understanding of technology integration in EFL contexts and practical insights for enhancing technology-mediated language teaching in China.

1.5 Research Objectives and Significance

The primary objective of this study is to explore the perceptions and practices of Chinese primary school EFL teachers regarding the integration of technology in their teaching, with a focus on the context of Hangzhou, Zhejiang Province. Specifically, the study aims to investigate teachers' general perceptions of technology and the affordances and constraints they perceive. It also examines the factors influencing their technology use and explores how teachers incorporate technology into their planning, delivery, and reflection processes. The study further considers the perspectives of school principals and EFL department heads to provide a more comprehensive understanding. These objectives are refined into specific research questions following the comprehensive literature review in Chapter Two.

The significance of this study lies in its potential to provide a range of stakeholders with insights to enhance primary school EFL teachers' acceptance and use of technology. These stakeholders include EFL teachers, school principals, local teacher councils, regional and national policymakers, and both local and international researchers. Additionally, the study could inform the development of tailored professional development programs that address teachers' specific needs, thereby supporting improved pedagogical practices. Through this investigation, the research seeks to contribute to advancing educational technology integration in Chinese primary schools.

1.6 Structure of the Thesis

The first chapter has contextualised the research by providing a brief introduction to EFL education in Chinese primary schools and technology integration in Chinese schools. It has articulated the rationale for selecting Hangzhou as the research site and presented the personal motivation behind this study. Furthermore, it has identified the

gaps that have led to the need for the current study, outlined the research aims, and established its significance.

Chapter Two provides a review of the literature relevant to technology integration in EFL teaching. It begins by exploring language teachers' perceptions of technology use in teaching, followed by their classroom practices with technology. The chapter also examines the factors influencing language teachers' adoption and implementation of technology in the classroom. To conclude this chapter, three research questions are proposed.

Chapter Three is a relatively short chapter which introduces three key frameworks that inform the understanding of technology integration in education, including the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and the Technological Pedagogical Content Knowledge (TPACK) model. The chapter further justifies why these models were adopted for the current study.

Chapter Four outlines and justifies the methodology employed in this study. It begins with an overview of the convergent mixed-methods research design, which integrates quantitative and qualitative approaches to address the research questions. The chapter then provides detailed information about the participants, as well as the data collection and analysis methods utilised in each phase of the study. Additionally, it describes the approach used in the data merging phase, where quantitative and qualitative findings are integrated to provide a more comprehensive understanding of the research phenomena.

Chapter Five presents the quantitative findings obtained through the survey and reports on teachers' perceptions of technology, their perceived affordances and constraints of technology, and their reported use of technology in the classroom.

These findings provide a general picture of teachers' perceptions and use of technology, responding to all three research questions of this study.

Chapters Six, Seven, and Eight present the qualitative findings of the study through a multiple case study approach, addressing all three research questions. Each chapter focuses on one case school, examining EFL teachers' perceptions and use of technology in their classes, the rationales behind their technology-related choices, and the factors influencing their technology use. Additionally, these chapters incorporate the perspectives of school principals and English department heads (EFL heads), who provide insights into the same phenomena from an administrative viewpoint.

Chapter Nine synthesises and integrates insights from both quantitative and qualitative data sources. It begins with a cross-case analysis to identify common patterns, differences, and relationships, offering a deeper understanding of the research phenomena. Subsequently, the chapter integrates the quantitative and qualitative findings to provide a more comprehensive picture of technology use in EFL teaching, thereby addressing all three research questions.

Chapter Ten discusses the key findings in relation to existing literature. It examines findings related to teachers' perceptions, practices, rationales, and influencing factors. Furthermore, it elucidates the study's contributions to current knowledge and to the TAM, the UTAUT, and the TPACK models.

Chapter Eleven concludes the study by summarising its overall findings, contributions, limitations, and significance in the context of technology integration in EFL teaching. The chapter also reflects on the implications of the research for theory, practice, and policy, and identifies directions for future research to further explore technology use in EFL contexts.

Chapter 2 Literature Review

2.1 Introduction

This chapter reviews the literature on language teachers' perceptions of technology adoption and use, the integration of technology in language teaching and learning, and the factors influencing such integration, with a particular focus on the Chinese primary school EFL context. The review begins with a broad examination of language teachers' perceptions of technology, followed by an exploration of technology integration in language education, particularly in EFL settings. It then examines key factors affecting teachers' technology adoption. These areas of the literature are presented sequentially for clarity, which means that factors that influence technology are briefly introduced, as relevant, in the sections on perceptions and integration of technology before a more thorough examination of factors is presented in Section 2.4. Through this systematic review, gaps in the existing literature are identified, leading to the formulation of specific research questions that guide the current study.

2.2 EFL Teachers' Perceptions of Technology Adoption and Use

Teacher perceptions of technology, as conceptualized in this study, refer to the dynamic, multifaceted mental constructs that language teachers hold regarding the value, usefulness, ease of use, and pedagogical affordances of technology for their teaching practices and students' learning (Borg, 2015; Ertmer, 2005; Wang, 2021).

To further distinguish this concept from related constructs, it is essential to note that while "beliefs" (Pajares, 1992) typically denote relatively stable, deeply held propositions about teaching and learning that teachers consider to be true, "perceptions" encompass a wider range of subjective interpretations, including attitudes, emotions, expectations, and situational evaluations that may evolve with

experience and context (Aydin, 2013). In contrast, “cognitions,” as used in Borg’s influential teacher cognition framework (Borg, 2003, 2015), is an overarching construct that includes knowledge, beliefs, decision-making processes, and practical knowledge. However, the present study focuses specifically on teachers’ subjective evaluations and interpretations of technology rather than their entire cognitive system. Therefore, the term “perception” is deliberately chosen to suit the aims of this study.

This conceptual choice aligns with established EFL and technology integration literature, where the term “perceptions” has been widely adopted to capture the fluid and context-sensitive nature of teachers’ views in rapidly changing technological environments (e.g., Li & Ni, 2011; Wang, 2021, 2024; Bai et al., 2021). Critically, using “perceptions” allows for a more nuanced examination of both positive affordances and perceived barriers in the Chinese primary school EFL context, where teachers’ views are often shaped by contextual factors that may not be fully captured by the more static notion of “beliefs” alone.

Building on this conceptualization, this section reviews the literature on language teachers’ perceptions of technology. It first outlines the commonly perceived benefits of technology. Then, it briefly presents the perceived challenges that teachers encounter. Next, it discusses discrepancies between teachers’ perceptions and their actual use of technology in class. Finally, it focuses on the specific context of Chinese EFL teachers to outline the research gap that this study aims to address.

2.2.1 Perceptions of Benefits

Across diverse geographical and cultural contexts, EFL teachers demonstrate consistency in recognising the potential benefits of technology for language education. Studies conducted in countries ranging from Spain (Waddington & Charikova, 2022) and Turkey (Özer, 2018) to Saudi Arabia (Sultan-Alshraideh, 2021; Alzubi, 2019) and Indonesia (Katemba, 2020; Pardede, 2020) reveal that teachers

generally perceive technology as an effective tool for enhancing student motivation and engagement.

The most frequently cited benefit by EFL teachers is that technology enhances student engagement and motivation in classrooms. Teachers report that technology tools, such as IWBs and tablets, make lessons more interesting and appealing to students (e.g., Duran & Cruz, 2011; Garib, 2023; Lin, 2016; Tsai, 2019). For example, in a study involving 74 primary school EFL teachers in Taiwan, Tsai (2019) found that teachers used IWBs to attract students' attention with diverse media effects and supplementary information. Additionally, teachers report that interactive technologies create motivating learning experiences. For instance, Maya et al. (2022) found that Indonesian primary school EFL teachers described digital storytelling activities as “engaging” and “fascinating” for students, highlighting how narrative creation with technological support enables student choice and personalised content development. Similarly, Duisenova et al. (2024) demonstrated that primary school EFL teachers in Kazakhstan perceived gamification platforms like Kahoot! and Quizizz (applications for game-based quizzes and formative assessment) as highly motivating for students, due to immediate feedback and competitive elements such as points and leaderboards. Such practices exemplify a pedagogical shift toward interactive, student-centred methods, where technology integration fosters engagement as a core teaching strategy rather than a mere add-on.

Another widely recognised benefit is that technology enables teachers to access authentic materials to enhance their teaching. In many EFL contexts where English is not usually used in daily communication, teachers perceive technology as a useful tool to bring real-world language into their classrooms (e.g., Aldukhayel, 2021; Watkins & Wilkins, 2011; Garib, 2023). For example, research in Japan demonstrated how university EFL teachers appreciated online videos, such as YouTube videos, for providing exposure to real-life contexts, diverse accents, and colloquial language that

traditional textbooks cannot offer (Watkins & Wilkins, 2011). Similarly, secondary school and university EFL teachers in conflict-affected regions like Syria and Lebanon valued technology for providing authentic materials and creating multimodal learning environments that transcend geographical and temporal limitations (Garib, 2023). Here, effective technology integration is understood as the deliberate use of digital resources to extend learning beyond the classroom, enabling students to engage with authentic language in real-world contexts rather than simply drilling textbook grammar.

Moreover, teachers across various contexts perceive technology as useful for fostering learner autonomy and developing essential 21st-century skills. For example, research in Iran demonstrated how EFL teachers at a language institute viewed e-portfolios as beneficial for promoting student ownership and self-regulation (Esmacilee, 2024), while studies in Algeria found that university EFL teachers believed that technology encourages students to work and explore independently (Naima, 2017). Among EFL teachers, this perception extends beyond language skills to include the development of digital literacy, critical thinking, and collaboration skills that students need for future success (e.g., Yüksel & Eren, 2016). These perceived benefits are expanded on in Section 2.3, where they are also illustrated through teaching practices. They are revisited in Section 2.4 as part of a broader analysis of factors that influence teachers' use of technology in teaching.

2.2.2 Perceptions of Challenges

Despite widespread recognition of the benefits of technology, language teachers worldwide report facing challenges that hinder their adoption and use of technology. For clarity, these challenges can be categorised into external and internal constraints (Bingimlas, 2009; Ertmer, 1999).

External constraints, include factors extrinsic to teachers, and which teachers often

perceive as being beyond their control, such as inadequate infrastructure, insufficient institutional support, class size, and rigid policy environments (Wang, 2024; Mrosso & Ndibalema, 2024). Internal constraints, by contrast are factors that are intrinsic to teachers such as their personal beliefs, attitudes, and established pedagogical practices. EFL teachers report feeling underprepared due to insufficient training opportunities and express concerns such as insufficient technological competence and low confidence (Aydin, 2013; Katemba, 2020).

Such perceived challenges can contribute to teachers' anxiety and resistance and lead them to view technology use in class as an additional burden rather than a pedagogical enhancement (Wang, 2021). These perceived challenges are further expanded on in Section 2.3, which shows how such barriers shape and constrain teachers' pedagogical choices, before being revisited in Section 2.4 as part of a broader analysis of the factors that influence teachers' use of technology.

2.2.3 The Gap between Perceptions and Practice

Research reveals that there can be a gap between language teachers' positive perceptions of technology and their actual classroom implementation, which is often related to the challenges teachers perceive in technology integration. For example, Wang's (2021) research in a Japanese university showed that despite high survey ratings for technology's usefulness, language teachers' actual use of technology remained low. The research attributed this gap largely to teachers' fear of losing classroom authority and cultural norms emphasising traditional teaching approaches. Similar patterns have been documented in other contexts, such as research in Yemen and Iran, where EFL teachers faced constraints such as inadequate infrastructure and insufficient technological training which impacted their use of technology despite teachers having generally positive perceptions (Ahmed et al., 2020; Hedayati & Marandi, 2014).

Research also suggests that teaching experience influences how teachers' beliefs about technology relate to their actual classroom use. For example, studies have found that pre-service EFL teachers may exhibit positive attitudes and strong willingness to use digital technologies, though their optimism is often accompanied by anxieties about future workplace conditions and recognition of their limited pedagogical experience (e.g., Özer, 2018; Sardegna & Dugartsyrenova, 2014). In contrast, in-service EFL teachers may demonstrate more pragmatic perceptions regarding technology, shaped by classroom realities. They are more likely to cite practical concerns about time management, classroom control, and alignment with curricular requirements as factors tempering their enthusiasm for technology integration (see for example, Kalra, 2018).

2.2.4 Chinese EFL Teachers' Perceptions of Technology

Research examining mainland Chinese school EFL teachers' perceptions of technology remains limited, particularly at the primary school EFL level. In one of the few studies undertaken, Li and Ni (2011) found that while primary school EFL teachers viewed technology positively and recognised its potential value, they primarily used it in a teacher-centred way rather than innovative pedagogical approaches. This suggests that even when technology is present, the underlying pedagogy remains rooted in knowledge transmission rather than student-centred exploration. The study also revealed that teachers' technology self-efficacy (teachers' confidence in their ability to use technology to perform a task (Compeau & Higgins, 1995) and perceived barriers related to their technological knowledge and skills, including a lack of training and insufficient time to develop these skills, significantly influenced their technology integration practices.

At the university level, Wang (2024) found EFL teachers' perceptions of technology were strongly influenced by top-down policy directives and a collectivist culture where peer and institutional encouragement played a significant role. Teachers

perceived technology as “meaningful” when it aligned with pedagogical goals, but they also faced challenges stemming from the pressure of a high-stakes examination system and a perceived gap between ambitious national policies and the practical realities of classroom implementation, including large class sizes and insufficient technological training.

Recent studies have also explored teachers’ perceptions of specific technologies in different educational contexts in China. Ning et al. (2024) investigated primary school EFL teachers’ views of social media-based microlearning, which involves delivering learning content in short, focused segments, and found that teachers recognised its potential for flexibility and authentic language exposure, although they identified challenges in designing and implementing learner-centred approaches. During the COVID-19 pandemic, a study of K-12 (from kindergarten to the end of secondary school) EFL teachers’ perceptions of online teaching revealed that while some teachers developed positive attitudes toward digital platforms, the effectiveness of their online teaching was closely tied to their technological pedagogical content knowledge and prior experience using technology (Zou et al., 2022). Additionally, Huang et al. (2023) explored university EFL teachers’ emergency remote teaching experiences and found that their attitudes evolved from initial doubt and rejection to fondness and attachment as they developed coping strategies. These findings collectively suggest that teachers’ perceptions of technology are highly context-dependent and can change over time as they gain experience and develop new competencies.

Research from Hong Kong provides insights into primary school EFL teachers’ perceptions about technology within a different Chinese cultural context. For example, Bai et al. (2021) found that teachers’ technology anxiety, technology self-efficacy, and intrinsic interest were crucial predictors of their intention to continue using technology in their classes. Additionally, Moorhouse and Yan’s (2023) study

explored both primary and secondary school EFL teachers' perceived affordances of technology and found that they had positive attitudes toward technology for student engagement alongside concerns about training needs. However, these findings from Hong Kong may not reflect mainland China's educational context due to divergences in governance, assessment regimes, pedagogical orientations, and language-in-education policies under the "one country, two systems" framework (a principle under which Hong Kong, as a special administrative region of China, maintains its own separate governing and economic systems; Zhang et al., 2019). Overall, research on Chinese primary school EFL teachers' perceptions of using technology in teaching remains limited, a gap which the current study aims to address.

2.3 Integration of Technology in Language Teaching and Learning

Empirical studies reveal a landscape of pedagogical practices in EFL instruction, where technology is used not only to enhance existing teaching methods but also to provide new opportunities to optimise students' learning experiences (e.g., Sari, 2024; Gan, 2025). This section reviews literature in this field, beginning by examining whole-class, teacher-led instruction where there is usually only one device in the classroom, which means students engage with technology one at a time with limited opportunities for individual use. It then explores teachers' practices in multi-device settings that enable multiple students to engage with technology simultaneously. Subsequently, it investigates how teachers use technology to scaffold and support learning, and to facilitate skill development. Finally, it examines teachers' technology use practices in the Chinese primary school EFL context before identifying gaps in the existing literature.

2.3.1 Use of a Single Device within Whole Class Instruction

In a common mode of technology integration, digital tools such as projectors or IWBs are used to support teacher-led, whole-class instruction. A key characteristic of this

mode is that the technology serves as a single focal point for the entire class, with student engagement with technology being either sequential (one at a time) or generally limited in terms of direct, hands-on opportunities (Al-Saleem, 2012; Drigas & Papanastasiou, 2014). Within this mode, teachers often use technologies to present learning materials in multiple modes, such as text, images, and audio. For instance, a large-scale European study by Whyte et al. (2014) found that primary and secondary school foreign language teachers frequently used IWBs to create multimodal lessons incorporating images, audio, and video files.

Research shows that teachers report using these multimodal features within technology in whole-class teaching to enhance student engagement and motivation. For example, Öz (2014) found that foreign language teachers at the primary and secondary level utilized the multimodal features available within IWBs, such as images and videos, to keep students interested and engaged. Specifically, Baz (2016) found that Turkish pre-service EFL teachers used visual materials to make learning content more tangible and to facilitate students' understanding. Likewise, Balbay and Erkan (2018) found that Turkish university EFL teachers employed IWB's multimodal and interactive features, such as game-based activities, to make classes more interactive and to motivate students in their learning. Moreover, Jalali and Talebi (2014) found that when Iranian pre-service EFL teachers used PPT to deliver multimodal content in reading comprehension courses, students' performance significantly improved compared to traditional textbook-based instruction.

Research also suggests that teachers integrate technology to foster more direct, tool-based classroom interaction, which encourages student participation in class (Kress, 2009). For example, Schmid and Whyte (2012) observed that teachers in European primary and secondary school foreign language contexts actively integrated common IWB practices such as “drag and drop” matching games and “hide and reveal” activities where individual students interacted one at a time with the board in front of

their peers. Similarly, Shruthi et al. (2024) found that secondary school EFL teachers integrated videos and interactive games to support a Total Physical Response (TPR) approach, for example, by displaying action-based videos on the IWB and guiding students to mimic these actions through game-based tasks, which created a dynamic learning environment that reduced stress and encouraged active physical interaction.

Furthermore, some research explores how teachers organise group-based activities that are supported and managed through technology in a whole-class setting. In this approach, teachers orchestrate collaboration within student groups while actively mediating students' turn-by-turn interaction with the technology, reflecting their deliberate integration of technology into classroom instruction. For instance, Gee (2003) argues that well-designed video games can be employed for whole-class activities where competing teams take turns to solve problems, promoting collaboration and situated learning. Similarly, Bado and Franklin (2014) found that in a Burkina Faso high school EFL classroom, teachers integrated educational video games via a shared classroom computer, with student groups taking turns to interact with the technology while collaborating on tasks to improve their vocabulary and writing skills.

However, despite the perceived affordances of these interactive tools, research cautions that simply incorporating technology into whole-class instruction does not automatically enhance engagement or transform pedagogy (Li & Ni, 2011; Zhao & Frank, 2003). Studies from various contexts have reported that technology like IWBs are sometimes used in ways that limit, rather than enhance, classroom interaction in foreign language contexts (e.g., Schmid, 2010; Higgins et al., 2007). For example, Li et al. (2018) and Li et al. (2019) found that in Chinese primary schools, the IWB was frequently used more like an advanced projector, primarily serving to reproduce traditional, teacher-centred instruction. This suggests a critical gap between technology use and meaningful pedagogical integration, where the technology is

adopted without a corresponding shift in instructional practices.

In addition, while studies report some tool-based interaction in technology supported whole-class teaching, such as “drag and drop” matching games, this was often limited to individual students manipulating digital objects (Glover & Miller, 2001; Whyte et al., 2012; Higgins et al., 2007), due to the availability of only one device in the classroom. For example, Schmid (2010) observed in a German secondary school EFL class that the “one-at-a-time” nature of such interaction often created a passive audience, rather than facilitating meaningful communication. The gap between the potential of technology and its actual usage underscores a critical point: the pedagogical design of tasks is more important than the technology itself (Higgins et al., 2007). The next section focuses on collaborative tools that have the potential to distribute agency more evenly among learners and reduce reliance on sequential participation.

2.3.2 Use of Digital Tools to Increase Student Participation and Interaction

Beyond single-device instruction, research highlights how teachers integrate mobile devices (e.g., smartphones, tablets) and interactive platforms (e.g., Kahoot!, blogs) to reconfigure learning environments. In these contexts, pedagogy manifests as teachers’ purposeful enactment of simultaneous participation, collaborative interactions, and autonomous learning in class (Licorish et al., 2018; Gan, 2025). For instance, research shows that teachers use game-based platforms on mobile devices to promote students’ simultaneous participation in class. Licorish et al. (2018) found that in a New Zealand university EFL course, a teacher’s incorporation of Kahoot! to assess students’ understanding on smartphones enhanced simultaneous interaction and motivation through real-time feedback and competition. Similarly, Balaskas et al. (2023) reported that in a Greek primary school EFL classroom, a teacher’s use of Kahoot! to simultaneously quiz students achieved high engagement and deepened students’ understanding.

Furthermore, research suggests that teachers achieve technology integration by aligning mobile devices and interactive platforms with Task-Based Language Teaching (TBLT) and collaborative learning approaches (Ali et al., 2024; Gan, 2025). In these contexts, pedagogy is enacted through the teacher's purposeful design of tasks that foster simultaneous participation and peer-led interaction, which enhances EFL outcomes (e.g., Ali et al., 2024; Gan, 2025). For instance, Ali et al. (2024) reported that in a Saudi high school, an EFL teacher implemented a task requiring students to use Padlet (an online virtual bulletin board for sharing and discussing ideas) on their mobile devices. This collaborative activity improved their speaking competence through real-time peer feedback, as measured by IELTS criteria. Likewise, Gan's (2025) review of technology-enhanced task-based teaching in EFL contexts highlights tools like WhatsApp, Zoom, and Google Drive, which, accessed via mobile devices, were found to support tasks such as group discussions and real-time content sharing. This approach was also found to reduce students' anxiety and improve their oral production accuracy and fluency.

Beyond collaborative tasks, teachers exercise their agency to foster personalised learning environments by integrating mobile devices and accessible web resources into their instructional design. In this context, pedagogy is enacted as a practice of differentiation, where teachers curate digital content to meet the diverse needs and paces of individual learners. For example, Sari (2024) found that in an Indonesian university EFL classroom, lecturers and students positively perceived different mobile applications like Duolingo and web platforms like YouTube and BBC Learning English for their accessibility, engagement, and personalised learning.

In sum, mobile devices, interactive web resources and platforms offer affordances that can overcome the limitations that arise when teacher-led, whole-classroom instruction is constrained by the use of a single shared device. Specifically, by enabling

simultaneous participation, collaborative learning, and personalised feedback, these tools have been found to enhance EFL learning outcomes across various educational levels.

2.3.3 Using Technology to Scaffold and Support Learning

Scaffolding refers to instructional support that helps students participate in and develop skills for tasks they cannot yet complete independently (de Oliveira & Westerlund, 2023). In EFL classrooms, technology can play an important role in assisting teachers in providing such scaffolding support. Drawing on Ashton's (2024) discussion of scaffolding strategies in language teaching, this section examines how teachers use digital tools to activate prior knowledge, sequence content, embed learning in meaningful contexts, support message abundancy, scaffold learning through customising materials, and facilitate formative assessment.

2.3.3.1. Activating Prior Knowledge for New Learning. Studies show that some language teachers integrate technology to activate students' prior knowledge in class, enabling them to draw on what they already know to support the construction of new knowledge. For example, Pham (2023) found that in Vietnamese primary school EFL classrooms, teachers facilitated warm-up activities by selecting short videos or designing digital guessing games with applications. Teachers believed that such approaches served as effective bridges to introduce new concepts in meaningful contexts, helping connect new content with students' existing knowledge. Similarly, Teng (2022) demonstrated how a primary school EFL teacher in Hong Kong incorporated a digital pre-viewing activity to activate students' prior knowledge, requiring them to match pictures from a video with the corresponding captions. This approach was found to significantly improve their subsequent vocabulary learning. These studies suggest that by activating prior knowledge through tools like videos or interactive applications, teachers could reduce the cognitive load and prepare students for new content.

2.3.3.2. Sequencing of Content to Support Learning. This approach involves sequencing content in a logical and progressive order, moving from simpler to more complex concepts so that students can build upon their understanding step by step (Ashton, 2024). For instance, Beliaeva (2023) illustrates how Italian university EFL teachers exercise their agency to orchestrate a multi-layered instructional sequence around authentic television shows. As pre-watching tasks, teachers introduced vocabulary and discussed related background knowledge. As post-watching tasks, they included comprehension checks and guided discussions. This sequencing of pre- and post-watching tasks helps scaffold students' understanding and supports their learning. In a similar vein, Cheung (2023) documented a secondary EFL teacher in Hong Kong sequencing a lesson from controlled to freer practice. The teacher integrated a suite of tools by transitioning from PPT for initial modelling to controlled drills via quizzing applications like Kahoot!, and ultimately progressing to more complex, open-ended production tasks via collaborative platforms like Padlet. These cases show how teachers, with the help of technology, design lessons and sequence content to scaffold student content comprehension and language production.

2.3.3.3. Context-embedded Learning. Research shows that some language teachers achieve effective technology integration by supporting new content learning through a context-embedded approach. This approach involves using relatable real-world examples in the classroom, such as visual aids or realia (Ashton, 2024). For example, Bansong and Poopatwiboon (2023) found that in primary school EFL classrooms, students achieved significantly greater vocabulary gains when teachers used PPT with images and videos to introduce new vocabulary contextually compared to conventional instruction without technology. In addition, Kirsch (2016) documented a primary school teacher in Luxembourg who employed an iPad application for a digital storytelling project. The teacher guided students to collaboratively create their own multimodal narratives by combining images, text, and

voice recordings. In doing so, the teacher utilised the technology to help students generate a rich, self-created context, which provided students with an opportunity to practice and reflect on their oral language skills. These studies illustrate how integrate technology to create authentic, meaningful contexts that support students' language learning.

2.3.3.4. Message Abundancy. Furthermore, research shows that some language teachers achieve effective technology integration by orchestrating message abundancy. This pedagogical practice refers to providing multiple forms of information and reinforcement to enhance students' understanding and retention (Ashton, 2024). For example, Rahayu et al. (2023) found that Indonesian junior secondary EFL teachers deliberately presented the same concepts and vocabulary through multiple modalities, using a combination of images, audio, video, and web links to enhance students' understanding. Similarly, Rauteda (2024) found Nepali secondary school teachers used bilingual slides, images, and code-mixing to support meaning-making through complementary redundancy across multiple semiotic channels. These studies show how teachers integrate technology to support student learning through repeating and reinforcing language in multiple ways.

2.3.3.5. Customising Materials to Meet Students' Learning Needs. Research indicates that some language teachers employ digital technologies to create and adapt instructional materials that address diverse learner needs through differentiated approaches. For example, Kótay-Nagy (2022) documented how Hungarian primary school EFL teachers utilised digital tools to create interactive "grammar quests." These quests provided students with a curated collection of links to online grammar activities of varying difficulty. This practice exemplifies effective integration in pedagogical terms, as the teachers did not merely provide links, but structured a differentiated process that allowed students to navigate tasks based on their individual proficiency levels. Similarly, Glas et al. (2023) documented collaborative design

efforts in Chile during COVID-19, where secondary school EFL teachers co-designed inclusive materials, integrating multimodal supports through social media and video conferencing to accommodate learner needs under infrastructure constraints.

2.3.3.6. Facilitating Formative Assessment. Finally, effective technology integration is evident in how teachers exercise their agency to enhance the immediacy and precision of formative assessment. In pedagogical terms, this involves moving beyond technology use for simple grading toward integrating digital tools to create a responsive feedback loop that informs subsequent instruction. Studies report that EFL teachers in primary and secondary school contexts employ technologies, like the IWB, for whole-class formative assessment. For example, Samsonova (2018) found that United Arab Emirates primary school EFL teachers perceived that using IWBs allowed for effective questioning, dynamic demonstration of concepts, and real-time scaffolding of student learning. In addition to classroom display technologies, research shows that EFL teachers utilise digital tools to automate aspects of the feedback process, particularly for writing in class (e.g., Liu, 2024). For example, Potok and Spjut (2023) found that in Poland and Sweden secondary EFL classrooms, teachers facilitated writing tasks by integrating Automated Writing Evaluation systems during class for real-time feedback and outside class for autonomous revision.

Research also shows that EFL teachers employ various digital platforms and tools to facilitate formative peer-assessment, shifting some evaluative responsibility to the students themselves (Widodo & Chakim, 2023; Kireeti et al., 2024). According to Widodo and Chakim (2023), who conducted research in Indonesian university EFL classrooms, such peer assessment using technology encourages students to develop crucial analytical skills, enhances their self-confidence, and increases their focus during class activities like oral presentations. However, this approach is not without its challenges. Research by the same authors highlights significant issues, including

students' anxiety about assessing their friends, friendship bias leading to subjective scoring, and even explicit cheating, such as making pre-arranged agreements to give each other good scores. To mitigate these challenges, teachers implement more structured technological approaches to support peer evaluation. For example, Kireeti et al. (2024) found that in a Japanese university EFL classroom, teachers facilitated peer-assessment by using collaborative digital tools, such as Google Docs, to guide students in co-constructing assessment criteria for oral presentations. The researchers found that this co-construction of evaluation standards fostered positive perception and greater learner ownership. Overall, the findings of these two studies suggest that strategically integrating technology can empower students and give them a voice in the evaluation process.

In summary, the existing literature indicates that EFL teachers employ a range of digital tools to enact various scaffolding strategies. However, a closer examination reveals that this research landscape is uneven, with greater emphasis placed on secondary and higher education contexts, leaving primary school settings comparatively under-researched. This gap is particularly acute in the Chinese primary school EFL context, where despite the rapid integration of technology into the Chinese education system, there remains a scarcity of research exploring how teachers employ technology to scaffold student learning.

2.3.4 Technology for Skill Development

Research shows that teachers use technology not only to guide learning activities through which students develop linguistic competence, but also to cultivate crucial twenty-first-century skills (e.g., Shadiev & Wang, 2022). This section reviews the literature on how teachers use technology to foster several key competencies, including linguistic skills, learner autonomy, digital skills, research skills, and critical thinking skills.

2.3.4.1. Developing Linguistics Skills. As revealed by Section 2.3.3, the primary goal of the technology-mediated activities designed by EFL teachers is the cultivation of students' core linguistic skills. Research such as Chapelle (2005) argues that teachers could use digital tools to provide rich and comprehensible input and prompt learners to “notice” specific linguistic forms within this input, for instance, by highlighting target vocabulary or grammatical structures, which is considered a crucial step for language acquisition. Empirical evidence supports this point. For example, a major meta-analysis by Grgurović et al. (2013), which synthesised 37 different studies, found a small but statistically significant positive effect favouring technology-supported pedagogy over non-technology-based instruction. Their findings confirmed that technology is at least as effective as, and in studies with rigorous research designs, often superior to, classroom instruction without technology in promoting language learning outcomes.

2.3.4.2. Cultivating Learner Autonomy. Research reveals that teachers use technology to cultivate learner autonomy by providing students greater control over their learning. Research in Indonesian high schools by Kencana (2025), for example, shows how EFL teachers use technology to provide students with access to extensive resources, enable personalised learning pathways, and deliver instant feedback, thereby fostering learner autonomy. Students in the study reported that using online collaborative tools like Google Docs and Slides for group assignments, alongside writing support tools such as Grammarly, empowered them to improve their work independently. This enhanced sense of choice and control is a critical component of autonomy. For example, a study from Alrabai (2021) conducted in a Saudi Arabian higher education EFL context found that teaching strategies explicitly designed by the teacher using technology to increase students' perceived choice and control over their learning led to statistically significant gains in learner autonomy.

2.3.4.3. Developing Digital Skills. Research suggests that students' use of

technology in the classroom can benefit their digital skills. Even when using large, teacher-fronted technologies like IWBs, students practice foundational digital skills through physical interaction with the device, such as manipulating objects via “dragging and dropping” or “hiding and revealing” (Shi et al., 2023). This development of digital competence becomes more explicit when personal devices like tablets are available to students. For instance, a case study by Couse and Chen (2011) in the United States on preschool children using tablet computers showed that teachers play a crucial role in supporting the acquisition of new technology skills. Through direct instruction and scaffolding, teachers successfully guided young learners to become comfortable with the tablet, mastering functions like using a stylus for drawing, selecting digital tools, and erasing. This demonstrates that teachers’ use of technology in the classroom provides opportunities for students to build their digital skills, whether through interaction with a whole-class display or through direct guidance on personal devices.

2.3.4.4. Cultivating Research Skills. Beyond digital skills, research suggests that teachers use technology to cultivate students’ research skills by helping them to navigate and evaluate information sources. Kuhlthau (2010) found that United States primary and secondary school teachers used technology-supported inquiry approaches to guide students to explore diverse sources, apply evaluation criteria, and develop independent research capabilities. The literature also provides examples of how teachers guide students to use a suite of digital tools to scaffold the research process. For example, Brooks (2015) shows how teachers in the higher education settings guided students to use platforms like Wikipedia, word cloud generators, and simple databases to develop keywords, visualise connections between ideas, and evaluate sources.

2.3.4.5. Cultivating Critical Thinking Skills. To build on students’ ability to locate and evaluate information, research has found that language teachers leverage

technology to foster critical thinking skills, enabling students to analyse and synthesise information effectively. For example, Algouzi et al. (2023) found that university EFL teachers' use of a video-mediated program, significantly enhanced critical thinking skills among undergraduate English majors in Saudi Arabia. Similarly, Bağ and Gürsoy (2021) found that secondary school EFL teachers significantly improved students' analytical and evaluative skills by integrating critical thinking activities, such as debates and problem-solving tasks, into technology-supported instruction in Turkey.

While the preceding review demonstrates the various ways teachers use technology to cultivate a range of student skills, many of these studies are conducted in secondary or higher education settings. Therefore, there is limited research exploring how teachers perceive and use technology to foster the skills in primary school EFL learners, particularly within the Chinese context.

2.3.5 Technology Use in Chinese Primary School EFL Classrooms

As mentioned in Chapter One, China's policy has advocated for technology integration in EFL classrooms. However, research consistently shows a gap between policy aspirations and the actual pedagogical practices of teachers (Li et al., 2018; Li et al., 2019). For example, Li et al. (2018) found that tools like PPTs and IWBs were primarily used as digital substitutes for traditional blackboards. From a pedagogical perspective, this represents "technology use" rather than "integration", as the fundamental teacher-centred dynamic remains unchallenged. Teachers utilize these tools to deliver content more efficiently, yet the underlying pedagogy remains instructional rather than transformational.

This substitutive approach has significant implications for classroom dynamics. This use of technology reinforces the traditional classroom pattern where teachers ask questions, students give short responses, and teachers provide feedback. Li et al.

(2018) found that primary school students mainly participated through group repetition and produced very little language on their own. In addition, Li et al. (2018) found that in well-equipped urban primary schools that claimed to achieve effective integration, teachers still struggled to change established teaching habits. This pattern appears to have remained consistent from early studies (Li & Ni, 2011) to more recent research (Li et al., 2019). Consequently, despite having better access to technology, pedagogy does not appear to have changed in line with the policy expectations. One gap of these existing studies is that while they document the patterns of technology use, the underlying rationale and decision-making processes that lead teachers to adopt such approaches remains under-explored.

In addition, some scholars have identified areas for methodological improvement within this body of research. For instance, Li et al. (2018) and Moorhouse and Yan (2023) note that some studies, particularly within certain Chinese-language journals, may rely on data from earlier periods or could benefit from more detailed reporting on their research design. Moorhouse and Yan's (2023) recent review indicates that empirical studies involving classroom observation data from Mainland China published after 2020 are relatively limited. This suggests that our understanding of technology use in classrooms may not fully reflect developments under current policies, including the 2022 English Curriculum Standards. Therefore, there is an opportunity for research to examine technology use in Chinese primary school EFL classrooms in the context of the current 2022 Curriculum Standards, thus providing insights into current classroom practices.

2.4 Factors affecting teachers' adoption of technology

Research has shown that a range of factors, operating at different levels, work together to influence teachers' adoption and use of technology (e.g., Zhao & Frank, 2003). While some of these influencing factors have been briefly mentioned already

when outlining existing studies, to better understand this phenomenon, this section brings them together and organises them according to three categories: teacher-level, school-level, and system-level factors.

This section reviews factors affecting technology adoption among teachers across various educational contexts including language teachers, as many relevant studies do not explicitly distinguish the subject taught. The final section outlines the research gaps specific to the Chinese primary school EFL context.

2.4.1 Teacher-level Factors

This section discusses a range of teacher-level factors, including attitudes towards technology, pedagogical beliefs, technology self-efficacy, technological skills, teaching experience, agency, and age.

Research indicates that teachers' attitudes toward technology influence their use of it: teachers who hold positive attitudes toward technology tend to use it more, while those who do not hold positive attitudes use it less (e.g., Ertmer, 1999; Tondeur et al., 2017). For example, Amaniampong and Hartmann (2023) found that university teachers in Ghana who liked technology were more likely to use tools like computers, websites, and mobile phones in their lessons. Similarly, Teo (2012) studied a group of pre-service teachers in Singapore who were training to teach at the secondary level. The study showed that those who enjoyed using computers were much more likely to plan to use them in the future. Additionally, Hue and Jalil (2013) also found that university teachers in Vietnam who had positive attitudes towards technology tended to use it more in their classrooms, revealing a moderate positive correlation between their belief in its benefits and how frequently they used it. However, studies also reveal that even teachers with positive attitudes may still not use it much if they face challenges such as lack of proper support or training (e.g., Teo, 2012; Amaniampong & Hartmann, 2023).

More specific perceptions influence teacher's choices in more nuanced ways. For example, the Technology Acceptance Model (TAM, Davis, 1989), which will be discussed in detail in Section 3.3, posits that teachers' perceived usefulness and perceived ease of use are key predictors of their adoption of technology. This has been supported by numerous empirical studies and meta-analyses (e.g., Scherer, 2018). While this quantitative finding is robust, qualitative studies add crucial nuances that help to understand why teachers sometimes resist adopting new technologies. For instance, Harendita (2013) found that Indonesian secondary school EFL teachers may resist a useful technology tool not because they doubt its utility, but because they view technology as an external, add-on tool, rather than an integrated part of their lessons. Consequently, they may consider time using technology a deviation from the "real" content of their teaching and a waste of valuable instructional time.

In addition, research establishes that teachers' pedagogical beliefs can determine whether teachers adopt technology and how they use it in teaching (Ertmer et al., 2012; Tondeur et al., 2017; Kim et al., 2013). Kim et al. (2013), in a study of K-12 teachers in the United States, found that teachers' fundamental beliefs about the nature of knowledge and learning relate to their technology use practices. K-12 teachers who view learning as an active process where students construct their own understanding tend to use technology in more student-centred ways (e.g., Kim et al., 2013; Tondeur et al., 2017). Ertmer et al. (2012) found that K-12 teachers in the United States who held deep student-centred beliefs were able to overcome external barriers, such as lack of resources or administrative support, to enact their desired technology-mediated teaching approaches. In contrast, K-12 teachers who believed that knowledge is delivered from teachers to students used technology primarily for "giving" information to students rather than facilitating active learning (e.g., Hammond & Manfra, 2009).

However, some research indicates this relationship is not absolute and is mediated by the school environment (e.g., Tondeur et al., 2017; Zhao and Frank, 2003). For instance, So and Kim (2009) conducted an intervention study with pre-service teachers in South Korea and found that despite developing good skills, their integration of technology was limited. This was because they believed student-centred, problem-solving activities involving technology were too time-consuming and difficult to manage within the curriculum. Likewise, Zhao and Frank (2003) found that K-12 teachers in the United States constantly balanced their beliefs against the pressures and affordances of their local context, including support from colleagues and competing school initiatives. Therefore, while the literature cites pedagogical beliefs as foundational, teachers' use of technology in the classroom is contingent upon the compatibility between their pedagogical beliefs and the school environment.

Teachers' technology self-efficacy is another cornerstone of their technology use. As mentioned in Section 2.2.4, technology self-efficacy refers to teachers' confidence in their ability to successfully use technology to perform tasks in teaching. Research reveals a positive relationship between teachers' technology self-efficacy and their actual use of technology. For example, Teo (2012), in a survey of pre-service teachers in Singapore, found that technology self-efficacy was a key predictor of teachers' attitudes towards technology. This finding is echoed by a meta-analysis from Scherer et al. (2018), which demonstrated that technology self-efficacy has a direct effect on teachers' intentions to use technology. Teachers who feel competent and confident are more likely to experiment with new digital tools, persist through technical difficulties, and ultimately use them in more meaningful ways (Scherer et al., 2018). Conversely, teachers with low confidence face barriers. For instance, in their study of K-12 teachers in the United States, Ertmer and Ottenbreit-Leftwich (2010) showed how knowledge and confidence intersect with beliefs and school culture and suggested that a lack of confidence can prevent a teacher from attempting to use technology, regardless of their beliefs.

Closely related to confidence are teachers' technological skills, which research has found to significantly influence their teaching with technology. For instance, Inan and Lowther (2010) surveyed 1382 K-12 teachers in the United States and found that teachers' technology proficiency was one key factor influencing their technology use, with higher skilled teachers demonstrating greater frequency of use. Similarly, a large-scale survey of secondary school teachers in the United States by Becker (2000) revealed that teachers with higher technological expertise used three times more types of technology (e.g., presentation tools, communication tools) than their peers. Likewise, in their study of Turkish high school EFL teachers, Contuk et al. (2024) showed how teachers' technological skills enabled them to use tools like Kahoot! and Google Classroom to foster student engagement and creativity in EFL classes.

However, despite findings about the importance of technological skills, researchers hold different views regarding their weight in relation to other factors. Some studies view technological skills as the most direct predictor of teachers' technology use (e.g., Rabbianty et al., 2024; Erdin & Uzun, 2022). In contrast, other studies note that technological skills alone are not sufficient, as they interact with other factors such as institutional support and teachers' attitudes or beliefs. For example, Anderson and Dexter (2005) found that while technological skills were critical, their impact was moderated by school leadership and teacher attitudes. Likewise, Li (2014) demonstrated that teachers' technological skills are interconnected with other factors, including their pedagogical beliefs and institutional pressures such as exam requirements.

The role of teaching experience in how teachers use technology is another subject of debate in the literature, with studies presenting conflicting conclusions. Several studies indicate that teachers with more experience are less likely to integrate technology. For instance, Rabbianty et al. (2024) found that EFL university teachers

in Indonesia with under 20 years of teaching experience tend to utilise a broader range of educational technologies compared to their more senior counterparts, as experienced educators often prefer traditional teaching methods or have limited exposure to technology early in their careers. Similarly, Inan and Lowther (2010), in their study of veteran teachers in the United States, found that an increase in years of teaching experience negatively affects teachers' computer proficiency and readiness to integrate technology. However, Erdin & Uzun (2022) in their study of Turkish EFL teachers from primary to university levels, found no significant relationship between the length of a teacher's career and their perceived technology proficiency. This finding suggests that experienced educators are successfully adapting and improving their technology skills, potentially through in-service training or by applying their pedagogical experience to new tools (Erdin & Uzun, 2022). These mixed findings suggest that the relationship between teaching experience and technology integration involves complex interactions that merit further investigation.

Closely related to teaching experience is the factor of age, where research also presents a complex and inconsistent picture. For instance, supporting the view that younger teachers are more adept with technology, Vungthong et al. (2017) found that in Thai primary school EFL classrooms, younger teachers were more likely to use a tablet application than their colleagues aged 40 and over. Similarly, Huang et al. (2019) noted that in a Chinese EFL higher education context, novice and young teachers saw themselves as a new generation reliant on technology in teaching, whereas senior teachers felt their content knowledge could compensate for a lack of technology use. However, a number of studies have found no significant relationship between age and technology adoption. For example, in a study on Turkish teachers of English from various educational levels (including primary, secondary, high school, and university), Erdin and Uzun (2022) found that the relationship between age and perceived technology proficiency was not meaningful. They suggested this might be because the COVID-19 pandemic exposed everyone to the internet and electronic

devices, helping all teachers acquire ICT skills regardless of age. Nevertheless, some pre-pandemic studies have similarly found no effect of teacher age on technology use, such as Mahdi and Al-Dera's (2013) study of Saudi University EFL teachers. Adding further complexity, some research suggests older teachers may actually implement technology more readily. In a study on university teachers, Henry (2008) found a positive effect of age on technology implementation, noting that older teachers tended to use technology in their classes to a greater extent than younger teachers. The study explained that older faculty members may be more comfortable with their subject content, which in turn gives them more confidence to experiment with new teaching methods that involve technology. As found with teaching experience, these studies show that there are mixed findings in relation to age and technology use. Additionally, some studies appear to conflate experience and age, illustrating complex interactions between factors that warrant further investigation.

Research also highlights that factors such as teacher beliefs and school context do not operate in isolation, and that their interaction can be navigated by teachers through the exercise of agency. Priestley et al. (2019) argue that agency is not a fixed personal trait that a teacher possesses, but rather is achieved through a dynamic interaction between a teacher's goals, beliefs, and knowledge, and the specific professional environment they work in. Teachers with agency purposefully weigh up factors like teaching beliefs, student needs, and available school support, often finding creative ways to overcome the constraints of technology or actively seeking out new tools rather than being deterred by barriers. The dynamic nature of teacher agency is illustrated by Zhang et al. (2023) in a study of high school EFL teachers in China. The research found that teachers exhibited different forms of agency when facing technological challenges. Some enacted passive agency, avoiding new interactive teaching approaches because they perceived them as unrealistic given their students' English proficiency. In contrast, others demonstrated active agency by proactively overcoming barriers, for instance, investing personal resources in professional

development when institutional support was lacking. These findings illustrate that technology use can be an outcome of teacher agency, reflecting how teachers actively navigate the opportunities and barriers within their unique school settings.

2.4.2 School-level Factors

While individual attributes are foundational, teachers operate within school contexts. The resources, support, and culture provided by this immediate environment can either enable or constrain a teacher's efforts to integrate technology. This section examines key school-level factors, beginning with tangible supports like technological resources, technical support, and professional development. It then explores the influence of the broader school environment, including leadership, school culture, and institutional time constraints.

The availability and nature of technological resources represent key school-level factors that influence teachers' integration of technology. At the most basic level, a lack of resources, such as an insufficient number of computers, limited materials, or poor internet connectivity, presents a direct and significant barrier to technology use (Norris et al., 2003; Amaniampong & Hartmann, 2023). Beyond mere availability, the quality of the infrastructure, such as the efficiency of routers and the speed of the internet connection, also directly impacts teachers' use and experience of using technology (Amaniampong & Hartmann, 2023). Additionally, the design and nature of the technology matters. For technology to be effective, its pedagogical design and affordances must align with specific learning goals, whether for practicing skills or developing concepts (Drijvers, 2015). This includes access to appropriate digital resources and curriculum-aligned software, not just the hardware itself (Zucker & Light, 2009). Ultimately, research suggests that effective technology integration requires teachers to have reliable access to both functional hardware and software that matches their teaching goals (Drijvers, 2015; Zucker & Light, 2009).

The availability of technical support is another critical factor influencing teachers' technology use in the classroom. Several studies highlight that when teachers perceive they have sufficient technical support, they are more likely to integrate technology into their teaching (e.g., Ertmer et al., 2012; Inan & Lowther, 2010; Zucker & Light, 2009). Ertmer et al. (2012) found that teachers who had access to technical support to keep computers operational were more likely to use technology for curricular purposes. Similarly, according to Inan and Lowther (2010), teachers reported that the presence of technical support to handle hardware and software issues enabled them to use technology more productively and with greater competence. Likewise, Li (2014) found that technical support mediated teachers' technology use by enhancing teachers' confidence. The study revealed that technical support offered in class was particularly useful, as when teachers felt they could get help when they encountered problems, it boosted their confidence and willingness to use technology. Conversely, insufficient technical support creates significant barriers to technology integration, as teachers may avoid using digital tools when they lack confidence in getting help with technical problems (Hue & Jalil, 2013; Amaniampong & Hartmann, 2023).

In addition to technical support, ongoing professional development has been found to influence teachers' use of technology. Research (e.g., Teo, 2012; Pynoo et al., 2012; Zucker & Light, 2009) shows that teacher training is associated with greater use of technology for instruction. Conversely, studies identify a lack of appropriate technological training as a barrier to technology integration (e.g., Hue & Jalil, 2013).

However, research suggests that not all professional development is equally effective. Zucker and Light (2009) and Li (2014) indicate that one-off workshops focused only on technical skills are largely ineffective, as effective professional development must be ongoing and cover both technical and pedagogical knowledge. Darling-Hammond et al. (2017) further emphasise that effective training should involve active learning, where teachers are not passive recipients but are engaged in observing, practicing, and

reflecting on new strategies. Such training should provide teachers with concrete examples of how to use technology to achieve specific learning goals. This process is reported to be most effective when it is collaborative in nature, allowing teachers to work together to refine their practice (Darling-Hammond et al., 2017; Higgins et al., 2012).

Beyond these direct support mechanisms, the vision and active support of school leaders, particularly the principal, are considered important for technology integration (Anderson and Dexter, 2005). As Fullan (2016) argues, leadership is central to any meaningful educational change. Research shows that effective leaders do more than just purchase equipment; they foster a shared vision for how technology can enhance learning, they publicly support and celebrate innovative teachers, and they create a safe environment where teachers feel comfortable taking risks (Prestridge, 2012).

This leadership helps to shape a positive school culture. When a school's culture promotes collaboration, sharing, and professional dialogue, teachers are more likely to integrate technology effectively. Higgins et al. (2012) point to the importance of professional learning communities where teachers can share ideas and solve problems together. Prestridge (2012) also found that collaborative environments, where teachers could learn from their peers, were a key enabler of technology use. In contrast, according to Ertmer and Ottenbreit-Leftwich (2010), a culture of isolation, where teachers work alone behind closed doors, can limit innovation and create barriers to technology integration.

Finally, time constraints represent a significant institutional barrier to technology integration at the school level. Teachers often report that there is simply not enough time, reflecting the reality that meaningful technology integration requires substantial investment in learning new tools, finding and evaluating digital resources, redesigning lesson plans, and troubleshooting problems (e.g., Ertmer et al., 2012; Tondeur et al.,

2017). This barrier is consistently documented across multiple qualitative studies, with case studies by Groth and Burgess (2009) and Ng and Nicholas (2010) all identifying insufficient time as a major limiting factor. Beyond daily time allocation, the structure of instructional periods also matters. For instance, Becker (2000) found that secondary school teachers with longer class periods (e.g., 90–130 minutes) reported more frequent technology use compared to those with traditional 50-minute classes, suggesting that extended time availability directly facilitates technology integration. Consequently, when school schedules are packed and teachers are burdened with administrative duties, they have little remaining capacity for the demanding work of pedagogical innovation.

2.4.3 System-level Factors

Both teachers and schools are situated within a larger education system, where policies set at the national or regional level can significantly shape the environment for technology integration. On the one hand, when policies and curriculum standards promote 21st-century skills, curricular autonomy, and flexible assessment methods, they can send a powerful message that encourages innovative, student-centred use of it (Arifatin, 2023; Hussain & Al Saadi, 2019; Chiu, 2022). On the other hand, this positive influence can be counteracted by the pressures of educational assessment, particularly in contexts that rely heavily on high-stakes, standardised testing, thus creating a tension between policy aspirations and practical constraints (Au, 2011).

The pressure of exams can create a range of barriers to technology integration, as this can narrow the curriculum and discourage teachers from trying innovative teaching methods that are potentially time-consuming and not directly aligned with test content (Ertmer, 2005). Several studies have found that restrictive curricula and high-stakes testing can act as significant barriers that may lead teachers to prioritise content coverage over project-based or inquiry-based learning with technology (e.g., Rubin & Kazanjian, 2011; Dede, 2010; Allehaby, 2024). As a result, studies have found that the

role of technology in these systems is frequently constrained, limited primarily to being an efficient tool for delivering existing content rather than fostering true pedagogical innovation (e.g., Means et al., 2003; Au, 2011). This can create a direct conflict, potentially forcing teachers to choose between meeting accountability demands and pursuing what they may believe to be better technology-enhanced pedagogical practices.

2.4.4 Factors Influencing Chinese Primary School EFL Teachers

The integration of technology in EFL instruction has become increasingly critical in Chinese primary education, yet studies have found that teachers face multiple barriers that influence their adoption and implementation of technological tools. Research examining technology use among Chinese primary school EFL teachers reveals a complex interplay of teacher-level, school-level, and system-level factors (e.g., Cao & Omar, 2023; Huang et al., 2019).

At the teacher level, internal factors such as strong self-efficacy, positive pedagogical beliefs, and digital competence are consistently identified as crucial predictors of success (e.g., Li, et al., 2014; Ran et al., 2024). This is further nuanced by qualitative work exploring how these positive attitudes manifest in specific practices, such as the perceived value of social media-based microlearning (delivering learning content in short, focused segments) for developing speaking skills (e.g., Ning & Liu, 2024). However, significant barriers persist, including low technology self-efficacy (e.g., Huang et al., 2019), a perceived mismatch between technology and an exam-driven curriculum (Cao & Omar, 2023), and uncertainty over its appropriateness for young learners (e.g., Liu et al., 2017).

School-level factors play an equally important role. Active principal leadership is consistently highlighted as a critical enabler, pivotal for communicating policy and fostering a positive school climate conducive to innovation (e.g., Li et al., 2014; Ning

& Liu, 2024; Sang et al., 2011; Wu et al., 2019). This is complemented by a supportive school culture, which has been identified as a key mediator for digital initiatives (e.g., Lai & Shi, 2025). Conversely, limited hardware/software resources, especially in rural schools (e.g., Chen, 2024), lack of collaborative culture, and inconsistent support create barriers (e.g., Fan & Yang, 2020; Teo et al., 2018).

At the system level, policy support shows mixed effectiveness. While national policy regarding technology use in education provides a foundation (Li et al., 2014; Huang et al., 2025), implementation challenges persist. Zhao (2024) noted that curriculum focus on grammar over communicative competence dampens technology demand, while Chen (2024) highlighted urban-rural digital divides. Huang et al. (2025) found that for Chinese ethnic minority teachers, cultural values strongly influenced their perception of technology-related policy, and this perception of policy, in turn, was the single most significant factor driving their intention to use technology.

Research reveals that successful integration requires multi-level alignment. School leadership, policy communication, and professional support are as pivotal as teacher-level factors (Li et al., 2014; Wu et al., 2019; Sang et al., 2011). Despite growing attention, studies that investigate the multi-level factors (i.e., individual, school, and systemic) influencing technology use among primary school EFL teachers in China remain limited.

These complex multi-level interactions have driven methodological innovations in recent research, which has provided more comprehensive and nuanced insights. For example, Cao and Omar's (2023) systematic review covering 2019-2022 literature offers a comprehensive synthesis of recent research trends, identifying patterns that individual studies could not reveal. Additionally, large-scale quantitative studies have enabled researchers to examine relationships between multiple variables across diverse samples to reveal how different factors interact to influence teachers'

technology adoption (Huang et al., 2025; Teo et al., 2018). Furthermore, researchers have adopted mixed-methods designs to gain a more holistic understanding of technology integration. By combining detailed case studies (Ning & Liu, 2024) with large-scale surveys (Ran et al., 2024), such designs can capture both the contextualised experiences of individual teachers and broader implementation patterns, offering a more nuanced perspective on technology integration.

2.5 Research Questions

While the integration of technology in education is a global priority, its application within the specific context of Chinese primary school EFL classrooms remains under-explored. Research on Chinese primary school EFL teachers' perceptions of technology remains limited. In addition, research is needed on how Chinese primary school EFL teachers use technology in their classrooms under the current 2022 Curriculum Standards, as well as the rationale behind their technology choices. Furthermore, studies that investigate the multi-level factors (i.e., individual, school, and systemic) influencing technology use among primary school EFL teachers in China remain under-explored. Guided by these research gaps, this study will address three research questions:

RQ1: What are the perceptions of Chinese primary school EFL teachers on the use of technology, and the affordances and constraints of using technology, in their teaching practice?

RQ2: How do Chinese primary school EFL teachers use technology in their planning and practice, and what is the rationale behind the choices they make?

RQ3: What do Chinese primary school EFL teachers see as the factors that support or impede their use of technology in their teaching practice?

2.6 Chapter Summary

This chapter provided a comprehensive review of the literature on EFL teachers' perceptions of technology adoption and use, technology integration in language teaching and learning, and the factors influencing such integration, with particular emphasis on the Chinese primary school context.

The examination of language teachers' perceptions of technology reveals a consistent pattern across diverse international contexts. Teachers generally recognise the potential benefits of technology, particularly its capacity to enhance student motivation and engagement through interactive and multimedia content. They also value technology's affordances to provide access to authentic materials and foster students' skills such as learner autonomy. At the same time, teachers report facing challenges that hinder their adoption and use of technology. The literature also identifies a gap between teachers' positive perceptions of technology and their actual classroom implementation, suggesting that favourable attitudes alone are insufficient to guarantee effective technology integration.

This chapter reviewed literature on technology integration in EFL classrooms, describing practices in single-device, whole-class settings that support one at a time sequential student interaction with technology and those in multi-device environments that enable simultaneous student interaction with technology. Beyond these modes of use, the review examined how teachers employ technology for specific pedagogical purposes, from scaffolding learning through various strategies to cultivating broader student skills like learner autonomy and critical thinking. The review concluded that research on these practices has focused more on secondary and higher education, highlighting a gap in the primary school EFL context.

The analysis of factors affecting teachers' technology adoption reveals a complex

interplay of influences operating at multiple levels. At the teacher level, factors such as attitudes toward technology, pedagogical beliefs, technology self-efficacy, and teacher agency significantly influence adoption decisions. School-level factors, including the availability of technological resources, technical support, professional development opportunities, leadership support, and institutional culture, create environmental conditions that either enable or constrain technology integration. System-level factors, particularly educational policies, curriculum standards, and assessment systems, establish the broader context within which teachers make technology adoption decisions. The literature demonstrates that successful technology integration requires alignment across all these levels, with each level capable of either supporting or undermining integration efforts.

A review of the Chinese context reveals several gaps. First, research on Chinese primary school EFL teachers' perceptions of using technology in teaching remains limited. Second, there exists a temporal gap in empirical research, with limited recent studies that incorporate observation data documenting authentic classroom practices in Chinese primary schools, particularly those conducted after 2020. Third, few studies have employed multi-level analyses that simultaneously examine individual, school, and system-level factors influencing technology adoption and use among Chinese primary school EFL teachers. The identification of these gaps informs the research questions that guide this study (see Section 2.5).

Chapter 3 Three Models of Technology Acceptance and Use

3.1 Introduction

Frameworks serve as a guiding ‘lens’ for research, providing structured direction for research design and data interpretation (Creswell & Creswell, 2017; Creswell & Plano Clark, 2017). As technology becomes increasingly integrated into various domains, specific frameworks have been developed to understand and facilitate technology adoption and integration in different contexts.

Among various technology models, the Technological Pedagogical Content Knowledge Model (TPACK), the Technology Acceptance Model (TAM), and the Unified Theory of Acceptance and Use of Technology (UTAUT) are particularly relevant for exploring teachers’ perceptions of technology, their practices with it, and the factors influencing these practices. TPACK, designed specifically for education contexts to understand effective technology integration (Mishra & Koehler, 2006), is one of the most cited models in technology-mediated teaching (Tseng et al., 2022; Voogt et al., 2013). TAM, initially developed in business settings to explain user acceptance of technology (Davis, 1989), has been extensively adapted to educational contexts (Galimova et al., 2024). UTAUT, designed for broader contexts (e.g., healthcare, and business), synthesises eight existing technology acceptance models to understand users’ adoption behaviour (Venkatesh et al., 2003), and has gained recognition across various research fields, including education (e.g., Xue et al., 2024). The following sections will elaborate on these models and their applicability to this current study.

Although other technology integration models exist, the chosen frameworks align more directly with this study’s specific aims. For instance, the Substitution, Augmentation, Modification, and Redefinition (SAMR) model is primarily a tool for

classifying the different levels of technology integration, describing a spectrum from simple enhancement (Substitution) to the profound transformation of learning tasks (Redefinition). Its focus is less on the underlying factors that impact teacher decision-making. Similarly, the Diffusion of Innovations Model emphasises the macro-level process of how an innovation spreads through a social system, making it less suited for a more micro-level analysis of the contextual factors influencing teachers. In contrast, TPACK, TAM, and UTAUT examine technology integration, teacher perceptions, and the factors influencing adoption behaviours. Therefore, this study employs a combination of TPACK, TAM, and UTAUT, which serve as a comprehensive framework to inform the research design and to guide the subsequent analysis and interpretation of the findings.

3.2 Technological Pedagogical Content Knowledge (TPACK) Model

This section first introduces the background of TPACK. It then outlines the seven components of TPACK and explores two major areas of its application in practice relevant to this study. Following this, it examines key criticisms of the framework. Finally, the section justifies its adoption as a framework to inform this study.

The TPACK framework builds on Shulman's (1986) concept of Pedagogical Content Knowledge (PCK), which is conceptualised as the synthesis of content knowledge and pedagogical knowledge. This concept emphasises that effective teaching requires more than just knowing content or general teaching methods; it demands understanding how to teach specific content effectively. However, Shulman's model was developed before the digital era and did not account for technology's important role in education. To address this gap, Mishra and Koehler (2006) expanded the framework by adding Technological Knowledge (TK) and created a model where effective technology integration requires dynamic interaction among three knowledge domains: technology, pedagogy, and content.

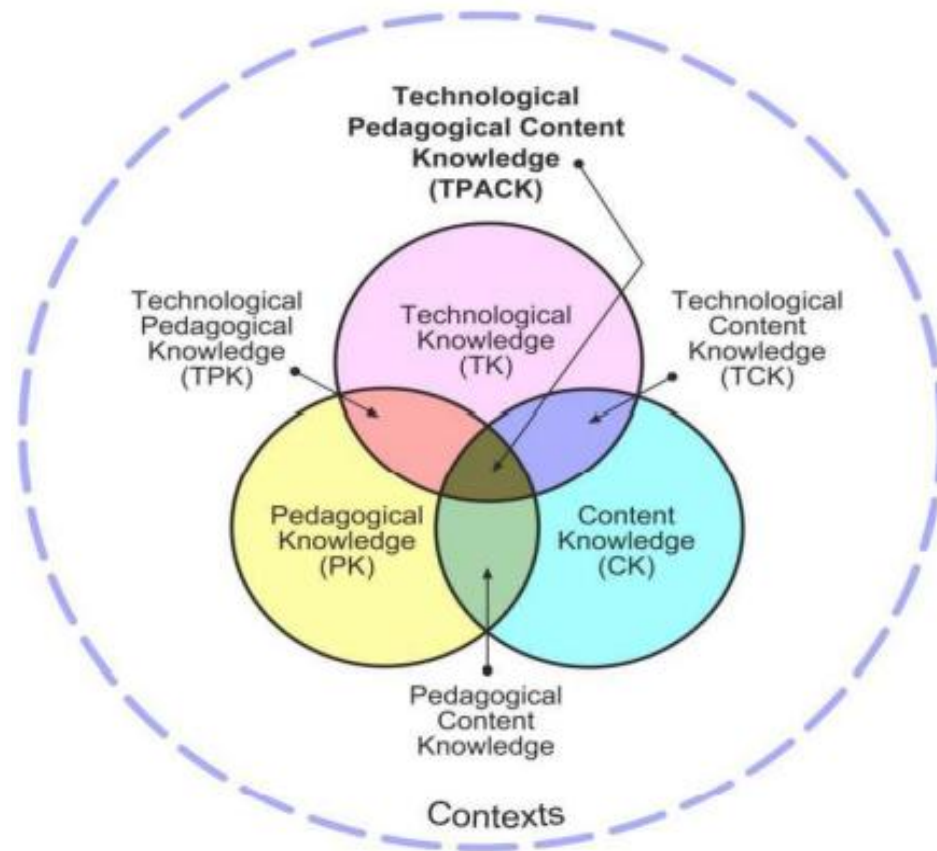
Mishra and Koehler (2006) supported their framework through both theoretical reasoning and empirical evidence from their research with pre-service and in-service teachers. They observed and analysed real-world teaching cases, finding that teachers who possessed strong knowledge in only one or two domains struggled with technology integration. Conversely, they found that meaningful technology integration, which they defined as technology use that genuinely enhanced student learning outcomes, occurred only when teachers effectively combined knowledge across all three domains. These findings support their framework's emphasis on the interplay of the three knowledge domains.

As a result, the new framework includes seven distinct components (Mishra & Koehler, 2006). The three primary knowledge domains are technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK). The intersections of these three domains form pedagogical content knowledge (PCK), technological pedagogical knowledge (TPK), technological content knowledge (TCK), and technological pedagogical content knowledge (TPACK). Figure 3.1 illustrates the seven components in TPACK and their relationships. The definitions of the seven constructs are as follows:

- a) TK: knowledge of how to employ technology.
- b) PK: knowledge of teaching approaches and strategies.
- c) CK: knowledge of the subject matter.
- d) PCK: knowledge of applying appropriate teaching strategies to teach subject content.
- e) TCK: knowledge of demonstrating subject content through technology.
- f) TPK: knowledge of applying technology to support teaching.
- g) TPACK: knowledge of using appropriate pedagogy and technology to facilitate students learning of specific content.

Figure 3.1

The Technological Pedagogical Content Knowledge Framework (Mishra & Koehler, 2006)



Given the widespread use of the model (Voogt et al., 2013), researchers have developed various methods to assess this knowledge. Qualitative data are typically collected through lesson plans, classroom observations, interviews, and stimulated recalls (e.g., Harris et al., 2012; Crosthwaite et al., 2023). Quantitative data, on the other hand, are often gathered through TPACK surveys, which provide a standardised way to measure teachers' self-reported TPACK levels (e.g., Chuang, 2018; Schmid et al., 2021). However, since self-reported data may not fully capture teachers' actual knowledge, researchers have recently begun adopting a mixed-methods approach to obtain more comprehensive data. This represents a growing but still limited area of TPACK research (e.g., Schmid et al., 2021). For example, Nazari et al. (2019) employed a mixed-methods approach, combining TPACK surveys with semi-structured interviews, demonstrating how different methods can complement each

other to provide deeper insights into teachers' technological pedagogical content knowledge.

TPACK has also been employed as an analytical framework to understand the complexity of teachers' practices with technology and the reasons behind these practices (e.g., Sharp, 2017; Schmid et al., 2021). These studies demonstrate how TPACK can reveal the nuanced ways teachers navigate the intersection of technology, pedagogy, and content knowledge. Research shows that some teachers succeed in aligning technology-enhanced lessons to their goals while others face challenges due to gaps in their technological pedagogical content knowledge (e.g., Jang & Tsai, 2012).

Despite its widespread acceptance and application in research, the TPACK framework has faced criticism on several fronts. One major issue is the lack of conceptual clarity in defining knowledge domains (Angeli & Valanides, 2009; Cox & Graham, 2009). In particular, the technology domain has been criticised for its lack of clear definition and overly broad scope (Cox & Graham, 2009; Graham, 2011). This conceptual ambiguity has made it challenging for researchers to distinguish between knowledge domains, as their boundaries appear blurred (Brantley-Dias & Ertmer, 2013). For example, Brantley-Dias and Ertmer (2013) argued that it is difficult or impossible to distinguish the knowledge domains in practice.

Moreover, the lack of theoretical clarity hinders the framework's practical application. It prevents a clear demonstration of how these theoretical constructs manifest in real-world settings (Jaipal-Jamani & Figg, 2015), thereby limiting its practical usefulness for teachers and instructional designers (Archambault & Barnett, 2010; Cox & Graham, 2009). The framework has also been criticised for its insufficient attention to contextual influences, despite recognition of their importance in educational research (Angeli & Valanides, 2009; Rosenberg & Koehler, 2015).

While the criticisms regarding conceptual ambiguity and blurred boundaries between knowledge domains are valid and well-documented (Angeli & Valanides, 2009; Brantley-Dias & Ertmer, 2013; Cox & Graham, 2009), this study maintains that these limitations do not undermine the framework's utility. This is because the very complexity and overlapping nature of the TPACK domains reflect the real-world messiness of teachers' technology integration practices, which cannot be neatly compartmentalized.

By adopting TPACK, this study can move beyond simplistic "does/does not use technology" descriptions to examine how teachers' technological pedagogical content knowledge shapes their actual classroom practices. This makes TPACK particularly suitable for this research, which seeks to uncover the nuanced, context-specific ways in which primary EFL teachers enact technology in teaching. Thus, despite its acknowledged limitations, TPACK provides a robust and education-specific lens that aligns closely with the aims of this study.

3.3 The Technology Acceptance Model

While TPACK (Mishra & Koehler, 2006) was developed to explore how teachers integrate technology into classroom practices, the TAM Model (Davis, 1989) was developed to explain users' adoption of technology. Since these frameworks were developed independently to address different aspects of technology use, combining them offers a more comprehensive understanding of teachers' technology use. This multi-theoretical approach is supported by previous research, which has demonstrated the value of integrating TAM and TPACK frameworks. For example, Scherer et al. (2018) argue that linking TPACK to TAM could address TAM's shortcomings in conceptualising technology integration in teaching, as TAM does not specify the types of professional knowledge teachers need for effective technology use. Similarly, other

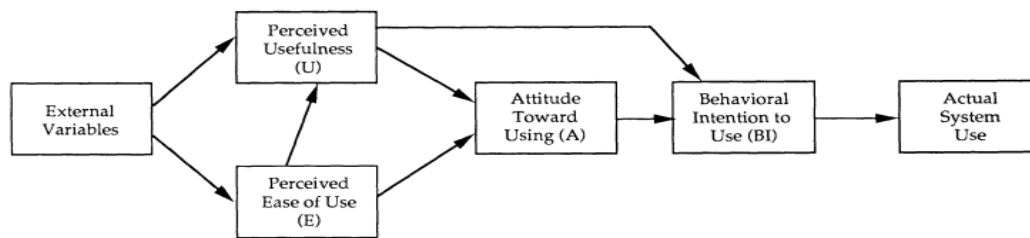
researchers have found that teachers' TPACK competence influences their technology acceptance, demonstrating that this combination provides a more holistic understanding of this process (e.g., Mei et al., 2018; Hsu, 2016). This section therefore introduces the core components of TAM and justifies its selection for this study.

Over the years, TAM has emerged as a leading scientific paradigm for investigating the factors that determine user acceptance of technology (Saadé & Kira, 2006). Figure 3.2 presents the structure of TAM. The model posits two fundamental dimensions, perceived usefulness (PU) and perceived ease of use (PEOU). Davis (1989) defined perceived usefulness as the degree to which a person feels that utilising technology would improve their work performance, whereas perceived ease of use refers to the degree to which a person believes that using technology will be free of effort.

According to Davis (1989), the mechanism of the model is as follows: Perceived ease of use has a positive effect on perceived usefulness, suggesting that the easier a person perceives technology to be, the more useful they tend to find it. Perceived usefulness directly affects users' behavioural intentions to use technology. Both perceived usefulness and perceived ease of use also influence users' attitudes toward technology. A user's attitude toward technology influences their behavioural intention, which subsequently affects their actual use of technology. Finally, external variables indirectly influence other components of TAM. Research has shown that factors such as gender, age, training, and technical support can impact perceived usefulness and perceived ease of use (e.g., Scherer et al., 2018).

Figure 3.2

The Technology Acceptance Model (Davis, 1989)



Despite the existence of various models for explaining technology adoption, TAM remains the most widely used framework due to its simplicity, adaptability, and strong predictive power regarding technology use intentions and behaviours (Hsiao & Yang, 2011; King & He, 2006; Marangunić & Granić, 2015; Scherer et al., 2018).

Specifically, TAM holds a dominant position in research on technology adoption in teaching practices (Scherer et al., 2018), with its validity consistently supported by extensive empirical studies (Alharbi & Drew, 2014; Liu et al., 2017; Bai et al., 2021; Al-Adwan et al., 2023). In educational settings, teachers' perceptions of usefulness and ease of use play a pivotal role in shaping their adoption decisions, making TAM a particularly suitable framework for this study.

An additional strength of TAM is its semi-open structure, which allows researchers to incorporate external factors relevant to specific contexts. While TAM identifies perceived usefulness and perceived ease of use as the primary determinants of technology adoption, it does not prescribe specific external variables, offering flexibility in model adaptation (Davis, 1989). For instance, Jung (2015) integrated instant connectivity, compatibility, interaction, content enrichment, and computer self-efficacy (one's belief in their capability to perform computer-related tasks) into TAM. Similarly, to adapt the model for the specific technology of wikis, Liu (2010) introduced the constructs of wiki self-efficacy (confidence in one's ability to use wiki technology), online posting anxiety (apprehension about sharing content online), and perceived behavioural control (belief in one's ability to control their behaviours) to

TAM. Modifying TAM in this way allowed these researchers to obtain a better understanding of the technology acceptance behaviours of students and teachers within their contexts and to address limitations they identified in the original TAM.

This flexibility is particularly valuable for this study, as it allows for the examination of unique external factors influencing technology adoption in Chinese primary schools. Given that this context remains underexplored in the existing literature, such adaptability enables a more nuanced understanding of the realities of EFL teachers' technology use in Chinese primary school classrooms.

Despite these strengths, the original TAM is not without critics. Its principle of parsimony (the idea of keeping the model as simple as possible by including only essential elements) is often criticised for leading to oversimplification. By focusing only on perceived usefulness and ease of use as core determinants, the original model relegates potentially crucial social, cultural, and organisational factors to a generic “external variables” category without specifying their roles or pathways (Bagozzi, 2007). Critics argue that this approach can fail to capture the complexity of real-world technology adoption, particularly in diverse cultural and organisational contexts. This perceived weakness was a key motivation for the development of more comprehensive models like UTAUT, which integrated concepts such as social influence and facilitating conditions as core constructs (Venkatesh et al., 2003).

Another related limitation is its lack of moderator variables. This means TAM does not inherently account for how individual differences (e.g., age, gender, experience) or contextual factors might change the strength of the relationships between its core constructs. Subsequent research and meta-analyses have found that the strength of these relationships often varies across different studies, suggesting potential moderating effects based on sample characteristics, contexts, and technology types (e.g., Nam et al., 2013; Teo & van Schaik, 2012; Scherer et al., 2018). This indicates

that while TAM identifies key determinants, its predictive accuracy could be enhanced by accounting for such moderating effects. Recognition of this limitation has also driven the development of more sophisticated models such as UTAUT.

Despite these limitations, the original TAM was selected as the model for this study, as its characteristics are uniquely suited to the study's aims. Even though it has been criticised for simplicity, it serves as a foundational lens to understand teachers' perceptions and adoption of technology. Its core focus on perceived usefulness and perceived ease of use aligns precisely with the objectives of RQ1, which examines Chinese primary EFL teachers' perceptions. In addition, its semi-open structure and "external variables" category provide the flexibility needed to adapt the model by incorporating unique, context-specific factors within Chinese primary schools. Therefore, after careful consideration, TAM provides the ideal balance of a solid base and the adaptability required for this study.

3.4 The Unified Theory of Acceptance and Use of Technology Model

This section introduces the Unified Theory of Acceptance and Use of Technology (UTAUT). It begins with an introduction of the model's development. It then presents the model's four core constructs and key moderating variables. Following this, the section provides a balanced overview of UTAUT's application, discussing its widespread use and flexibility in educational research, as well as the main criticisms. Finally, it justifies why UTAUT is employed in this study.

In 2003, Venkatesh, Morris, Davis, and Davis proposed the UTAUT model, which represents a significant evolution in technology acceptance research. It was developed after a systematic review and integration of eight major models, including TAM (Venkatesh et al., 2003). The primary aim of this integrative framework was to synthesise the strengths of these earlier models while addressing their limitations.

Specifically, compared to TAM, UTAUT provides a more comprehensive understanding by incorporating additional constructs such as social influence and facilitating conditions, while also considering four moderating variables (age, gender, experience, and voluntariness) that can influence technology adoption (Putra, 2018; Zhang & Yu, 2022).

UTAUT encompasses four core dimensions influencing an individual's intention and usage of technology: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC).

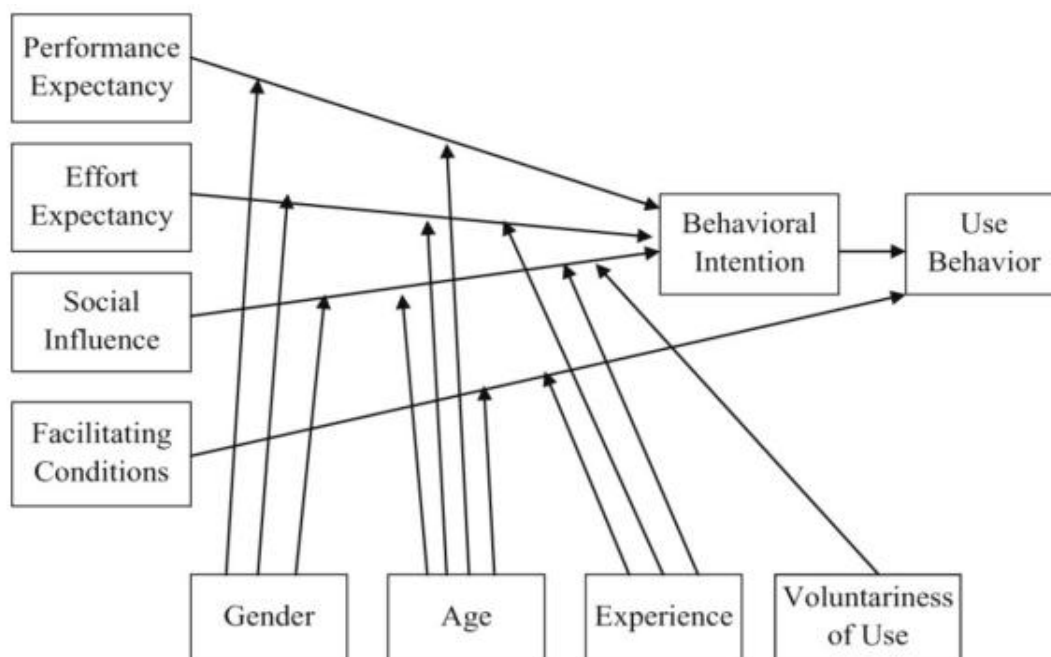
- a) Performance expectancy (PE) refers to a user's belief about whether technology will genuinely help them perform their job better. PE has been found to be the most important predictor of behavioural intention, moderated by age and gender.
- b) Effort expectancy (EE) captures how easy or difficult the user perceives the technology to be. EE has been found to be more prominent in the early use of technology, moderated by gender, age, and experience.
- c) Social influence (SI) addresses the social context, concerning the pressure a user feels from important people, such as colleagues or superiors, who believe they should use a specific technology. SI's effect on intention is moderated by gender, age, voluntariness of use, and experience.
- d) Facilitating conditions (FC) relate to the perceived practical support available, including the necessary training, resources, and technical infrastructure provided by the organisation. FC has been found to directly influence usage behaviour, and this effect is moderated by both age and experience.

These core constructs work together to provide a framework for understanding technology use. Specifically, the UTAUT model proposes that performance expectancy (PE), effort expectancy (EE), and social influence (SI) influence an individual's intention to adopt a technology directly. In turn, this behavioural

intention, along with facilitating conditions (FC), directly shapes an individual's ultimate usage behaviour. Furthermore, the influence of these primary relationships is moderated by four key variables: gender, age, experience, and voluntariness of use (Venkatesh et al., 2003). Figure 3.3 provides a visual illustration of these relationships.

Figure 3.3

The Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003)



UTAUT has been widely accepted as a powerful model in educational contexts (Scherer et al., 2018). An increasing body of research has explored the applicability of UTAUT in education, with studies focusing on both teachers (e.g., Mohammad-Salehi et al., 2021; Abd Rahman et al., 2021; Huang et al., 2025) and students (e.g., El-Masri & Tarhini, 2017; Nguyen & Chu, 2021; Zhang & Yu, 2022; Hsu, 2023). These studies highlight the model's capacity to capture a wide range of factors, from individual perceptions (e.g., performance expectancy) to contextual influences, such as social influence from peers and facilitating conditions provided by the institution, that collectively shape adoption intentions and behaviours (e.g., El-Masri & Tarhini, 2017).

Apart from its widespread application, a key strength of UTAUT, which is particularly relevant for this study, is its adaptability for extension. Researchers frequently adapt the model to specific contexts by integrating additional, theoretically relevant constructs. For instance, Huang et al. (2025) extended UTAUT by adding constructs like “Perceived Importance of Technology-related Policy” and “Cultural Value,” which were found to influence Chinese ethnic minority EFL teachers’ intention to use technology. Similarly, Abd Rahman et al. (2021) incorporated “teacher readiness” as a crucial factor influencing technology use. This shows that UTAUT, like TAM, allows researchers a certain level of flexibility based on specific contexts or research needs. This adaptability makes UTAUT particularly suitable for examining the unique factors influencing Chinese primary school EFL teachers’ technology adoption in this study.

While the UTAUT model was originally developed as a quantitative tool to predict technology adoption, its comprehensive conceptual framework has been increasingly adapted for qualitative and mixed-methods research to explore the nuances of user experiences. For instance, researchers have effectively used its constructs to guide qualitative interviews with EFL teachers, uncovering contextual barriers and enablers of technology adoption in order to develop a deep understanding of teacher experiences, rather than relying on surveys and quantitative analyses which merely predict teachers’ behavioural intentions (e.g., Babar, 2022; Cancino & Ibarra, 2023). This qualitative approach, however, is not without its own theoretical considerations. Some researchers critique that using a pre-defined framework like UTAUT can be too restrictive, potentially overlooking themes that arise directly from the data (Mitzner et al., 2019), while others argue that the model’s strong foundation in quantitative, predictive studies limits its ability to capture the rich, interpretive, and context-dependent aspects of user experience that are central to qualitative inquiry (Dwivedi et al., 2019).

To address these concerns, this study does not apply UTAUT as a rigid predictive tool but as a flexible conceptual guide. This integration allows the research to move beyond individual perceptions (RQ1, addressed via TAM) and knowledge domains (RQ2, addressed via TPACK) to examine the broader institutional factors, such as professional training and school leadership, that influence technology adoption (RQ3). Rather than using fixed measurement categories, the study treats UTAUT's constructs as "sensitising concepts" (Charmaz, 2014) to guide the qualitative inquiry within the Chinese primary education system. Accordingly, the model's core constructs are used to help identify the factors influencing teachers in the specific context of this study, while remaining open to other potential factors that emerge from the data. As illustrated in Figure 4.1, this integrated framework provides a clear roadmap for the research design and data analysis.

3.5 Chapter Summary

This chapter presented three complementary frameworks that are particularly relevant for understanding teachers' technology perceptions, adoption and integration, building directly on the literature review in Chapter 2. The Technological Pedagogical Content Knowledge (TPACK) model provides a comprehensive framework for understanding the complex knowledge domains required for effective technology integration. The Technology Acceptance Model (TAM) offers insights into the factors that influence teachers' adoption decisions, particularly perceived usefulness and perceived ease of use. The Unified Theory of Acceptance and Use of Technology (UTAUT) Model extends these insights by incorporating social and contextual factors, including performance expectancy, effort expectancy, social influence, and facilitating conditions. The integration of these three frameworks provides a robust theoretical foundation for examining the multifaceted nature of technology adoption in educational contexts.

Chapter 4 Methodology

4.1 Introduction

The purpose of this study is to explore Chinese primary school EFL teachers' perceptions and use of technology, as well as the factors influencing their use of technology in teaching. This chapter presents and justifies the methodology used in this study to achieve these research objectives. Research methodology, as defined by Creswell and Creswell (2017), is an organised approach to address research questions, encompassing principles and procedures for data collection, analysis, and interpretation (Hall & Howard, 2008; Creswell & Plano Clark, 2017). Based on this definition, the methodology in this chapter is presented, beginning with the overall mixed-methods research design, followed by an outline of the research setting and participants, data collection instruments and procedures, and data analysis. Finally, ethical considerations are discussed.

4.2 Overview of Research Design

This study utilises a mixed-methods approach to investigate teachers' perceptions and use of technology in their teaching. A mixed-methods approach involves utilising quantitative and qualitative methods to collect and analyse data, integrate findings, and draw conclusions in a single study (Tashakkori & Creswell, 2007). The rationale for this choice lies in two interconnected benefits central to mixed-methods research: achieving a more comprehensive picture of the targeted phenomenon (Bryman, 2006; Doyle et al., 2009) and offsetting the inherent weaknesses of each method by capitalising on their respective strengths (Bryman, 2006; Creswell & Creswell, 2017).

Specifically, this study integrates a quantitative survey with a qualitative case study approach. The survey provides a general understanding of teachers' perceptions and

use of technology by capturing responses from a larger number of teachers. However, the primary limitation of this method is its inability to uncover the contextual factors, as well as the complexities and rationales behind these perceptions and practices. This limitation is offset by the case study approach. A case study, as defined by Duff (2008), is “an intensive, holistic description and analysis of a bounded system, such as an individual, a group, or an institution, often drawing on multiple data sources to capture its complexity within its natural context” (p. 22). In this study, each school represents a separate case. Treating each school as a bounded system allows for each school to be analysed in depth and for differences and comparisons across schools to be examined. This approach also enables a detailed exploration of why teachers in each of the three schools perceive and use technology in specific ways. However, case studies are typically limited to a small number of participants. The survey method can compensate for this limitation by gathering data from a larger sample, thus providing the breadth that case studies lack. Together, the two methods create a synergistic effect, where the survey identifies “what” is happening on a broader scale, and case studies explain “why” it is happening in a specific context, leading to more comprehensive and robust findings.

Despite these advantages, the mixed-methods approach faces paradigm criticisms and practical challenges. Methodological purists argue that quantitative and qualitative methods, due to their differing ontological and epistemological bases, are incompatible and should not be mixed in a single study (Tashakkori & Teddlie, 2010; Creswell & Plano Clark, 2017). Other criticisms include the resource-intensive nature of mixed-methods research, which requires more time, resources, and expertise in both quantitative and qualitative methods (Ivankova et al., 2006; Doyle et al., 2009). Additionally, mixed-methods research may produce conflicting data, which requires sophisticated strategies for reconciliation (Migiro & Magangi, 2011).

While the mixed-methods approach is resource-intensive, these challenges have been

mitigated through careful planning in this study. Furthermore, this study reframes potentially conflicting findings between the two methods not as a weakness, but as an opportunity to reveal underlying reasons behind the studied phenomenon, which a single method might overlook (Creswell & Creswell, 2017). Therefore, the mixed-methods approach is particularly suitable for this study, enabling more comprehensive research findings that account for nuances.

Within the mixed-methods design framework, a convergent parallel design (quan+QUAL) is adopted in this study. Convergent parallel design refers to collecting quantitative and qualitative data simultaneously in the same time period and integrating them during the data analysis stage (Creswell & Creswell, 2017). Notably, this design prioritises the qualitative phase (QUAL). This is due to the exploratory nature of understanding the nuanced perceptions and technology use of teachers, which require rich contextual details that quantitative data alone could not fully capture.

The choice of a convergent parallel design is guided by two key considerations: pragmatic efficiency and specific analytical goals. As a doctoral student based in New Zealand, this design allows me to simultaneously collect both quantitative and qualitative data during my fieldwork in China, maximising the use of time. In addition, the convergent parallel design facilitates the direct comparison and juxtaposition of the two independently collected datasets in the analysis phase to achieve a more comprehensive understanding of the target phenomena.

To implement this design, for the quantitative phase, a survey is used to obtain a broad overview of Chinese primary school EFL teachers' perceptions, perceived affordances and constraints, and their use of technology in class (addressing RQs 1, 2 and 3). Concurrently, a case study approach is adopted to delve deeper into the qualitative aspects of these teachers' perceptions, practical applications and rationales,

and the factors that influence their use of technology in planning and teaching (addressing RQs 1, 2 and 3). This combined approach helps to reveal not just what technologies are used, but how and why they are used, allowing for an in-depth exploration of the nuanced, context-specific experiences of Chinese primary school EFL teachers in the classroom setting.

As illustrated in Figure 4.1, the integrated framework (combining TPACK, TAM, and UTAUT) directly guides the implementation of this research design. Specifically, TPACK informs the investigation of technology use (RQ2), while TAM and UTAUT are employed to examine teachers' perceptions (RQ1) and the broader influencing factors (RQ3). This mapping ensures a coherent alignment between the frameworks, the research questions, and the subsequent selection of instruments and data analysis methods.

Figure 4.1

Integrated Framework Guiding Methodology

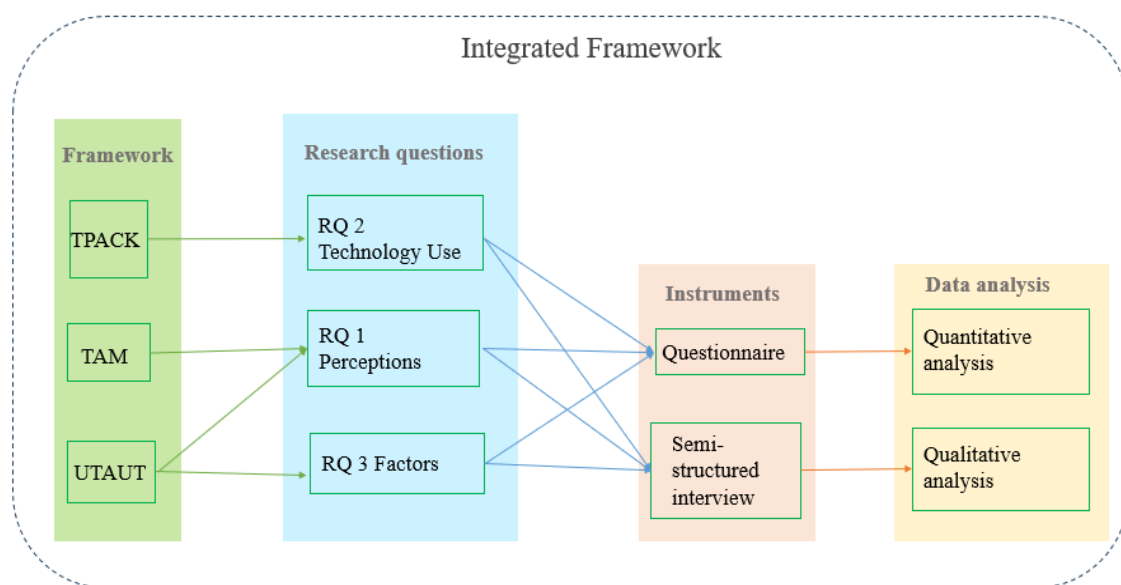


Figure 4.2 shows the research design and procedures. It illustrates the convergent parallel mixed-methods design adopted in this study, detailing the simultaneous collection of quantitative and qualitative data, followed by their integration in the

analysis phase. Additionally, Table 4.1 presents the overall design for data collection, providing a detailed overview of the research objectives, instruments used, and participants involved in each approach.

Figure 4.2

Diagram for Research Design & Procedures

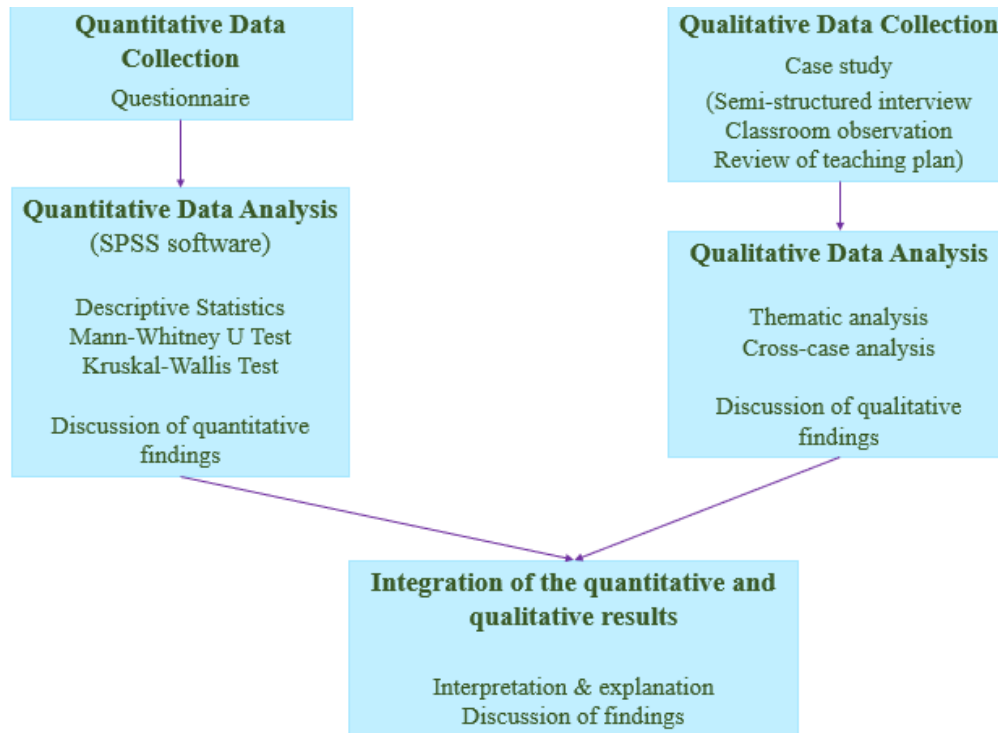


Table 4.1*Overall Research Design*

Phases	Answers to research questions	Instruments	Participants
Quantitative phase (Questionnaire-based survey)	All three research questions	Online questionnaire	Teachers (n=244) from seven districts and three counties
Qualitative phase (Case studies)	All three research questions	<ul style="list-style-type: none"> • Semi-structured interviews (2 rounds per teacher and 1 round for school principals and EFL heads) • Classroom observations (2 sessions per teacher) • Review of teaching plans 	<ul style="list-style-type: none"> • Case school (n=3) • Teachers (n=15) • EFL head (n=3) • School principals (n=3)
Integration of findings phase	All three research questions	<ul style="list-style-type: none"> • Cross-case analysis • Merging quantitative and qualitative findings 	All 268 participants

4.3 Research Setting and Participants

This section discusses the research setting and participants of the study. In the context of China, students typically begin formal education at the age of six and go through six grades in primary schooling (from Grade One to Grade Six).

Researchers have emphasised the importance of conducting research in contexts that are familiar to the researcher (Unluer, 2012). In line with this principle, I conducted this study in Hangzhou, China, where I reside and have a deep understanding of the local context. As mentioned in Section 1.2.3, the local government and educational bureau in Hangzhou demonstrate a strong commitment to the construction of educational technology infrastructure and strive to promote the in-depth integration of technology with education and teaching (Hangzhou Education Bureau, 2018, 2023). This creates an environment where teachers can easily access technology, which provides valuable opportunities to investigate teachers' perceptions and use of technology in primary school EFL contexts.

In addition, Hangzhou comprises ten districts and three counties, encompassing both urban and rural areas, as well as public and private schools. This variation allows for the inclusion of teachers from diverse school contexts, offering valuable insights into how different environments influence teachers' perceptions and use of technology. For example, urban schools may have better access to digital resources, while rural schools may face challenges related to infrastructure and training (Luo et al., 2022). This contextual variation within a single city enables the study to capture a more comprehensive understanding of potential factors that influence technology adoption across different educational settings.

4.3.1 Sampling and Participant Selection

The survey employed a geographically stratified convenience sampling strategy.

Convenience sampling refers to a non-probability method, with participants selected based on their accessibility (Etikan et al, 2016).

The sampling process involved several steps. First, I obtained ethical approval from Massey University. Following this, officers from district education bureaus provided me with the contact details of teacher educators who oversee primary school English teaching in their respective districts. With their consent, these teacher educators distributed my questionnaire link via WeChat groups. These groups were composed of primary school EFL teachers who had been identified as school representatives at the district level. This distribution method was chosen as WeChat is a ubiquitous communication tool in China, offering the potential for a significantly higher response rate compared to other contact methods. Teachers within these groups voluntarily chose whether to complete the questionnaire. Their participation constituted informed consent, which was clearly explained at the beginning of the questionnaire.

In the end, responses were collected from teachers across seven districts and three counties in Hangzhou, representing both economically advanced urban areas and less developed rural regions. However, responses from the remaining three districts were not collected, as the teacher educators from these areas declined to distribute the survey link to their WeChat groups in their districts, due to concerns about increasing the workload for frontline teachers.

The use of a convenience sampling strategy is acknowledged to have limitations. For example, it may introduce selection bias, as the teacher representatives in the WeChat groups may not represent the broader EFL teacher population (Etikan et al, 2016). In addition, as participation was voluntary, the teachers who responded may possess a higher level of motivation or a greater interest in the research topic than their peers within the same WeChat groups who chose not to participate.

Nevertheless, the specific approach taken in this study offered several advantages that justified its use. First, by collecting data across seven districts and three counties, the geographic spread of the sample was maximised, which enhanced the diversity and representativeness of the viewpoints collected. Second, this approach enabled cross-district and cross-school comparisons. Finally, from a pragmatic standpoint, this method allowed for efficient and safe data collection during the COVID-19 pandemic, when social distancing measures made broader face-to-face contact for large-scale sampling impractical.

In terms of the qualitative phase, both convenience and purposive sampling were used. The convenience sampling approach was adopted as I could only conduct research in schools where I was able to make contact with and obtain consent from the school principals. In addition, this approach saved time and reduced costs, allowing the project to proceed. However, the convenience approach meant that the sample of schools was not fully representative of all schools in the region.

To mitigate bias and ensure diversity in educational contexts, purposive sampling was also employed, which involves selecting schools based on specific characteristics (Etikan et al., 2016). Three schools matching the specific purposive criteria (two public schools - one urban and one rural, and one private urban school) were directly approached by the researcher. Following initial communications, all three schools granted approval for the study to be conducted. While convenience sampling inherently limits generalisability, purposive sampling ensured that the selected schools represented meaningful and diverse educational contexts.

4.3.2 Participants

This study involved multiple stakeholders in the primary education context. The following sections introduce the teachers who participated in the quantitative phase first, followed by those who participated in the qualitative phase.

For the quantitative phase, a total of 244 primary school EFL teachers responded to the questionnaire, constituting the final sample of the study. The demographic information for all these participants is presented in Table 4.2.

Table 4.2

Survey Participants Profile

Demographic information	Categories	Number	Percentage
Gender	Female	234	95.9%
	Male	10	4.1%
Age range	20-29	67	27.5%
	30-39	101	41.4%
	40-49	73	29.9%
	50-59	3	1.2%
	Over 60	0	0%
Years of teaching experience	Under 5	68	27.9%
	5-10	61	25.0%
	11-15	36	14.8%
	16-20	39	16.0%
	21-25	29	11.9%
	26-30	9	3.7%
	Over 30	2	0.8%
School type	public	210	86.1%
	Private	34	13.9%
School district	Xihu	66	27.0%
	Shangcheng	62	25.4%
	Gongshu	1	0.4%
	Yuhang	21	8.6%
	Xiaoshan	12	4.9%
	Linan	1	0.4%
	Fuyang	47	19.3%
	Chunan (rural)	13	5.3%
	Tonglu (rural)	4	1.6%
	Jiande (rural)	17	7.0%

As shown in Table 4.2, the sample comprised far more female teachers (95.9%, n=234) than male teachers (4.1%, n=10). In terms of age, nearly half of the participants (41.4%, n=101) were within the 30-39 age range. A substantial portion of

participants were also aged between 20-29 (27.5%, n=67) and 40-49 (29.9%, n=73). Teachers aged 50-59 accounted for the smallest group at only 1.2% (n=3).

Regarding teaching experience, 27.9% (n=68) of the participants have less than five years of experience, and 25.0% (n=61) are between six and ten years. Additionally, 14.8% (n=36) have taught EFL for 11-15 years, while 16.0% (n=39) have 16-20 years of experience. Teachers with 21-25 years of experience make up 11.9% (n=29), those with 26-30 years account for 3.7% (n=9), and those with over 30 years of experience represent only 0.8% (n=2).

Geographically, the distribution of participants was uneven across the sampled regions. A notable concentration of responses came from three main districts: Xihu (27.0%), Shangcheng (25.4%), and Fuyang (19.3%), which collectively accounted for over 70% of the sample. In terms of school type, the sample was predominantly composed of teachers from public schools (86.1%, n=210), while a smaller portion were from private schools (13.9%, n=34). This distribution reflects the broader national trend where public schools dominate the primary education landscape (see Section 1.2.1).

Table 4.3 shows the features of the three case study schools involved in the qualitative phase of the research. From each school, five EFL teachers, one head of the EFL department (EFL head), and one school principal were recruited voluntarily, with informed consent obtained from all participants. Further details about each case school and the profile of these participants are presented in the respective case study chapters in Chapters Six, Seven and Eight.

Table 4.3*Case Schools Profile*

School (Feature)	Apple School	Blueberry School	Cherry School
Location	Rural area	Urban area	Urban area
School type	Public school	Public school	Private school

The inclusion of multiple stakeholders, namely, EFL teachers, EFL heads, and school principals, was designed to provide diverse perspectives on the research questions.

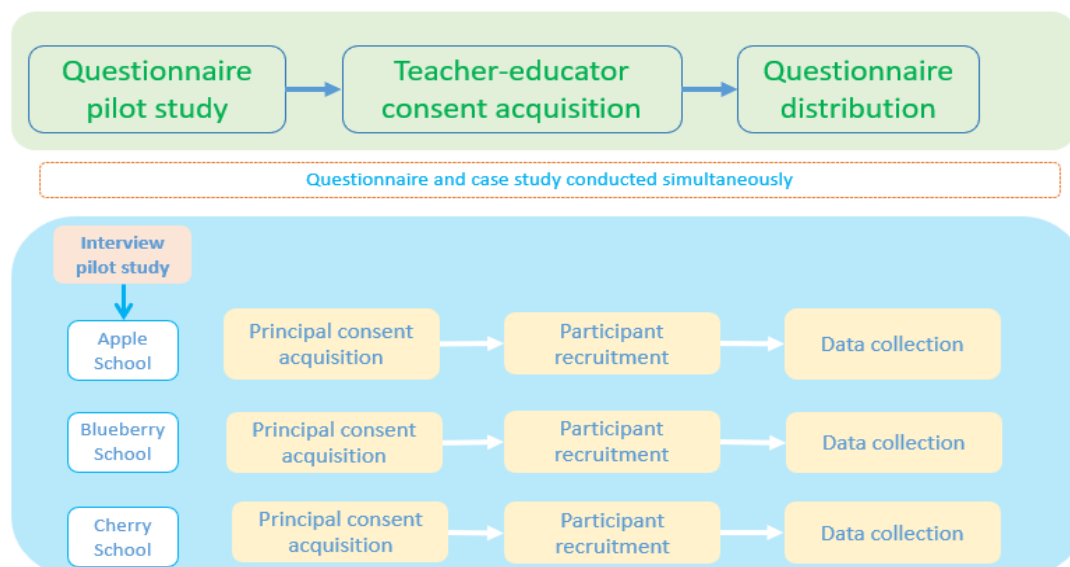
While EFL teachers offer direct insights into their perceptions of technology, practices with technology, and factors influencing their technology use, EFL heads and school principals provide additional lenses on the same issues. This is because the EFL head and school principal may share similar perceptions as the teachers, but as administrators, they may also have different views on these issues. Furthermore, involving EFL heads and school principals allowed for a deeper understanding of each school's unique context, including the sources of funding for equipment and the decision-making process behind the selection of technological devices. Therefore, by incorporating these multiple perceptions, this study might achieve a more comprehensive understanding of the target phenomena.

4.4 Data Collection

This section details the data collection methods employed in this study, in line with the mixed-methods research design outlined previously (Table 4.1). The entire data collection phase was conducted over a six-month period, from September 2022 to February 2023, and the overall process is visualised in Figure 4.3.

Figure 4.3

Data Collection Procedure



The following sections present each component of this process: questionnaire development and administration, followed by the qualitative data collection methods including document review, semi-structured interviews, and classroom observations.

4.4.1 Questionnaire

This section details the development and implementation of the questionnaire used in this study, formally titled “EFL Teachers’ Perceptions and Use of Technology in Chinese Primary School Classrooms” (see Appendices A for English version and B for Chinese version). This section begins by presenting the rationale for developing this instrument, followed by a description of its design process. Subsequently, it describes the pilot study undertaken and concludes by outlining the final administration procedure.

4.4.1.1 Rationale for Using Questionnaire. For the quantitative phase of this study, a questionnaire was developed to investigate Chinese primary school EFL teachers’ perceptions and use of technology in teaching. This method was selected for its well-documented advantages, including cost-effectiveness, the potential for timely

responses, and its suitability for accessing a large sample (Dörnyei, 2007).

Furthermore, an online format was utilised, which was particularly advantageous for ease of administration, especially given the constraints imposed by the COVID-19 pandemic.

4.4.1.2 The Design of the Questionnaire. A new instrument was designed for this study (see Appendices A and B). This section outlines the questionnaire design process, including a) why a new questionnaire was needed (limitations of existing surveys), b) what was measured (theoretical foundations and key constructs), c) how the questionnaire was structured (content and format), and d) how it was piloted and refined.

A review of existing questionnaires revealed several limitations that made them unsuitable for this study. Firstly, most existing questionnaires were not designed specifically for primary school EFL contexts in China. Some existing instruments were tailored to specific educational stages like secondary education (e.g., Teo, 2011), where factors influencing teachers' technology integration may differ from those in primary schools (Jung et al., 2015). Additionally, some were developed in non-language teaching contexts (e.g., Compeau, 1995; Gulbahar & Guven, 2008), making some items less applicable to EFL classrooms. Furthermore, some questionnaires were designed for different cultural contexts, making certain items irrelevant to Hangzhou primary school English classrooms. For example, observations in Hangzhou reveal that most primary school students do not use computers in EFL class. As a result, items such as "Students using computers for learning takes them away from important instructional time" (Kessler, 2007) are not applicable in this study.

Secondly, no existing questionnaire fully captures all four key dimensions relevant to this study: a) teachers' perceptions of technology, b) perceived affordances of

technology, c) perceived constraints of technology, and d) teachers' use of technology. Many existing instruments focus on a single dimension, such as teachers' attitudes toward technology (e.g., Kessler, 2007; Aydin, 2013), perceived constraints (e.g., Chaaban & Ellili-Cherif, 2017), or perceived affordances (e.g., Wang, 2021). In addition, using separate, detailed scales for each dimension would make the questionnaire excessively long, leading to participant fatigue and reducing response quality. Thus, a single questionnaire incorporating all four dimensions was considered more appropriate for this study.

Given the limitations detailed above, a new questionnaire was designed based on the research questions, existing surveys, relevant models and key constructs identified in the literature. In terms of established models, the TAM and UTAUT model provided the foundation for understanding technology acceptance among teachers. While the TPACK framework was also central to this study, it is more relevant to understanding actual technology use and was therefore applied primarily in the qualitative phase (interviews and observations) rather than in the survey design.

Regarding teachers' perceptions, the study was guided by both TAM and its extension, UTAUT. Therefore, core constructs such as perceived usefulness and perceived ease of use from TAM were included, which correspond to performance expectancy and effort expectancy in UTAUT (Davis, 1989; Venkatesh et al., 2003). In addition, existing research has found that EFL teachers' attitudes toward technology, beliefs about its use in teaching, and technology self-efficacy significantly influence technology use (e.g., Raman & Yamat, 2014; Cassim & Obono, 2011). Consequently, these constructs were also incorporated.

Beyond these perceptual constructs, the questionnaire also incorporated constructs related to the contextual factors and patterns of technology use identified in the literature review (see Chapter 2). Specifically, key perceived affordances (e.g.,

enhanced motivation, improved outcomes) and constraints (e.g., lack of technical support, time constraints) were included to capture teachers' experiences of facilitating and hindering factors. Additionally, the review identified general use, use for collaborative learning, and use for feedback as the most common applications of technology in the target context. Therefore, these were also included as core constructs for measuring teachers' technology use practices.

To inform the practical design of the instrument, well-established questionnaires from prior studies were reviewed, including foundational instruments of technology acceptance (e.g., Davis, 1989; Venkatesh & Davis, 2000) as well as those designed specifically for language teaching contexts (e.g., Kessler, 2007; Aydin, 2013; Wang, 2021). Following this review, all potential items were selected and evaluated to ensure their relevance and applicability to the Chinese primary school EFL context. For instance, an item such as "Using digital technology makes English lessons more interactive" was retained because fostering interactivity is a key goal in primary language education. Conversely, items like "I can teach my students how to make their own web pages" (Aydin, 2013) were excluded, as web design is not part of the primary school EFL curriculum in China.

To make the review and selection process more transparent, Table 4.4 provides examples of items from the literature that were considered for inclusion in the survey. The table shows how items were categorised by their original constructs before the final selection and adaptation for the current study's context. Therefore, the items presented do not necessarily appear in the final survey with the same wording or item number.

Table 4.4*Examples of Candidate Items Reviewed from the Literature*

Category	Candidate Item
Making Class Exciting	The use of technology as a learning tool excites students.
	Using technology in the classroom would make the subject matter more exciting.
	I think IWBs make learning more enjoyable and more interesting.
Interactive/ Collaborative Class	Technology facilitates collaborative work between students.
	IWB facilitates discussions on the content.
	Using IWB makes the English lessons more interactive.
	IWB helps my lessons be more interactive.
	I think IWBs increase the interaction and participation of the students.

Several steps were further taken to ensure the instrument was clear, concise, and easy for participants to respond to. To maintain comprehensiveness while minimising participant fatigue, only one or two representative items were selected for each construct. The selected items were then organised into a logical sequence, beginning with general perceptions, followed by affordances, constraints, and technology use.

Additionally, careful attention was paid to language and accessibility. A fundamental decision was to administer the questionnaire in Chinese, the native language of the participants and researcher, to maximise comprehension and response accuracy (Birmingham & Wilkinson, 2003). Within the final Chinese version, technical jargon was avoided, and the wording was refined to align with the everyday experiences of primary school EFL teachers.

Furthermore, to ensure a precise and shared understanding, the term “digital technology” was used in the questionnaire items instead of the broader term “technology” employed elsewhere in the thesis. This decision was informed by the

observation that in a Chinese teaching context, the term “digital technology” is directly associated with pedagogical tools, whereas the more general term “technology” might be interpreted more ambiguously. Furthermore, in Item 21 “I use a variety of digital technology in my teaching,” common examples like IWB and PPT were included in parentheses. The purpose of providing these prompts was to help teachers narrow their focus to the common digital technology used in their everyday classroom practice, thereby improving the validity and precision of their responses.

Moreover, to maintain consistency and reduce the cognitive load on participants, items were generally phrased in a positive direction. For instance, an item was phrased positively as “I find technology easy to use” rather than negatively as “I find technology difficult to use.” An exception to this principle was made for items measuring perceived constraints, which were worded to directly reflect barriers (e.g., “There is insufficient technical support”), as this better captured teachers’ experiences of challenges without creating confusing double negatives.

The instrument was ultimately organised into four main parts, which are detailed below. To provide a clear overview of the questionnaire’s structure and items, representative examples are presented in English in Table 4.5.

Table 4.5

Sample Questionnaire Items

Example 1: demographic questions in part I

Your gender:

<input type="radio"/> male
<input type="radio"/> female

Example 2: multiple choices in part II

7. The following technology is available in my classroom:

<input type="checkbox"/> Interactive whiteboard
<input type="checkbox"/> PowerPoint
<input type="checkbox"/> Internet
<input type="checkbox"/> Audio
<input type="checkbox"/> Video
<input type="checkbox"/> E-games
<input type="checkbox"/> Multimodal resources
<input type="checkbox"/> Learning software
<input type="checkbox"/> Word document
<input type="checkbox"/> Socio media (e.g., blog)
<input type="checkbox"/> MOOC
<input type="checkbox"/> tablet
<input type="checkbox"/> laptop
<input type="checkbox"/> APP
<input type="checkbox"/> videoconference
<input type="checkbox"/> E-mail
<input type="checkbox"/> Other types

Example 3: questionnaire items in part III

Item 9. Digital technology is useful for my teaching.

strongly disagree	disagree	slightly disagree	slightly agree	agree	strongly agree
①	②	③	④	⑤	⑥

Example 4: optional, open-ended questions in part IV

41. What do you think are the constraints of using technology in your class?

The first part (example 1) contains single-choice questions designed to collect demographic information, including gender, age range, years of teaching experience, frequency of technology use, school type, and location. This part aims to establish a demographic profile of respondents, enabling meaningful comparisons across different groups. Such data is crucial for comparison, as it helps determine whether teachers' perceptions and use of technology vary across these variables, providing deeper insights into the contextual factors influencing their technology use in Chinese primary school EFL teaching.

The second part (example 2) consists of multiple-choice questions that identify the types of technology that the respondents accessed and used. Since the questionnaire refers to "technology" in a broad sense, this part clarifies which specific technologies teachers are using, providing context for better interpreting their responses.

As shown in Table 4.5 (Example 2), Question 7 presented a checklist of technologies available in participants' classrooms. In addition, Question 8 (see Appendix A) asked teachers to detail the technologies they regularly used in their teaching. The list of technologies included hardware (e.g., IWB, audio and video equipment), software and applications (e.g., PPT, Word document, learning software), internet-based resources (e.g., Internet access, social media such as blogs), and multimodal and interactive tools (e.g., multimodal resources, E-games).

Following the approaches adopted in previous EFL technology integration studies (e.g., Amaniampong & Hartmann, 2023) and informed by the pilot study where participating teachers did not differentiate between categories, all listed technologies

were treated as “digital technology” in the survey. This data was collected to provide further detail and context for the responses to Item 21 (“I use a variety of digital technology in my teaching”). This granular data served to support interpretation of the variety of technologies teachers reported using in the findings chapters (Section 5.5).

The third part (example 3) consists of closed-ended questions designed to measure teachers’ perceptions of technology. A 6-point Likert scale, informed by the pilot study (see Section 4.4.1.3), was adopted. The fourth part (example 4) consists of optional, open-ended questions to gather information on teachers’ perceptions. While the Likert-scale items require teachers to select from predefined options, these open-ended questions allow them to express their own thoughts, capturing ideas that the Likert-scale items did not cover (Bryman, 2012).

4.4.1.3 Pilot Study of the Questionnaire. After finalising the questionnaire structure, a pilot study was conducted to ensure the clarity, validity, and feasibility of the instrument before large-scale data collection (Mackey & Gass, 2015). The following paragraphs outline the pilot study process and key modifications based on teacher feedback.

The pilot study involved ten primary school EFL teachers from Hangzhou, to whom the questionnaire was distributed via WeChat. To ensure the validity of the data, these teachers did not participate in the main data collection phase. The primary purpose was to assess the instrument’s content validity and overall feasibility. To achieve this, comprehensive feedback was sought from the participants. They were asked to evaluate the clarity and comprehensibility of the items, the relevance of the questions to their specific teaching context, and to identify any potentially missing or irrelevant questions. Additionally, participants were asked about any technical difficulties encountered with the online platform.

The feedback from the pilot study was largely positive, affirming the overall design and requiring no major structural changes, such as the addition or removal of items. However, the process led to several minor but crucial refinements that significantly enhanced the questionnaire's clarity. For instance, an ambiguous Chinese translation for "improve student learning" was revised to specify "improve the quality of student learning". To clarify what "limited technical support" referred to, a concrete example (i.e., "no technical troubleshooter available") was added in parentheses. Additionally, following one teacher's suggestion, a clear definition of the term "digital technology" was incorporated at the beginning of the questionnaire to ensure a shared understanding among all participants.

Finally, a 6-point Likert scale was adopted to structure responses, informed by the pilot study in which two versions (a 5-point and a 6-point scale) were tested. Results showed that when using the 5-point scale, participants tended to select the neutral "undecided" option, which made it difficult to capture their actual opinions. Consequently, the 6-point scale was selected for the final version, as this approach encourages more deliberate reflection and prevents participants from defaulting to a neutral response when they might otherwise avoid expressing a preference (Chyung et al., 2017).

4.4.1.4 Questionnaire Administration Procedure. The questionnaire was administered using an online platform called Sojump. The platform is popular and widely used in mainland China. Its user-friendly interface and ease of operation helped to increase response rates. As detailed in Section 4.3.1, quantitative data were collected by having teacher educators from each district distribute the questionnaire link to WeChat groups of EFL teachers in their respective districts. Teachers in the groups voluntarily completed the questionnaire. Additionally, a small number of responses were collected directly from the three case schools.

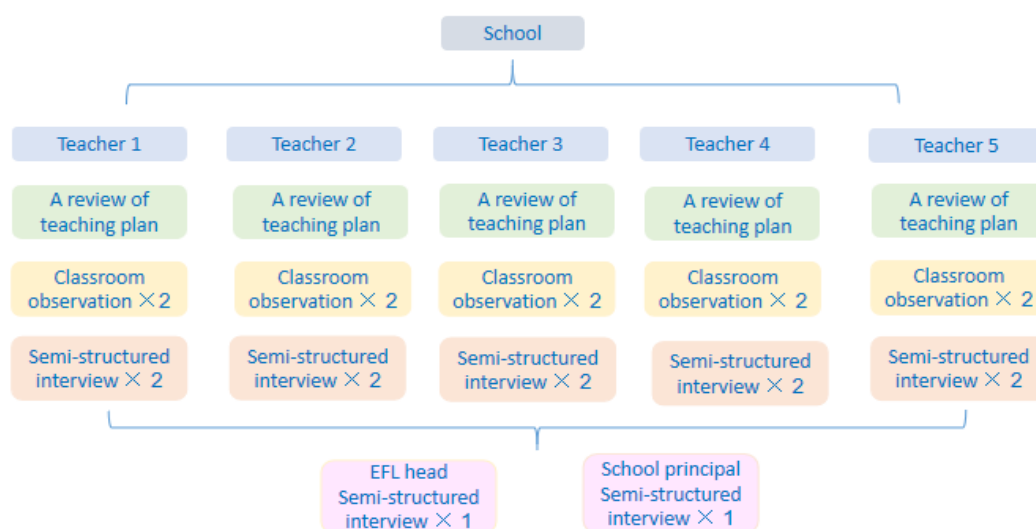
4.4.2 Qualitative Data Collection Procedure

The qualitative data collection for each case followed a sequential approach: review of teaching plans, classroom observations (2 sessions), and semi-structured interviews with EFL teachers (two rounds). The detailed rationale for choosing observations and interviews is provided in Sections 4.4.3 and 4.4.4. This sequential process enabled each stage to inform the next. Teaching plans were first reviewed to gain an initial understanding of the teachers' planning decisions (Yin, 2018), providing insights into how technology was incorporated into lesson planning. Classroom observations then provided opportunities to understand how teachers' pedagogical plans involving the use of technology were enacted and adapted in class. Finally, semi-structured interviews explored teachers' perceptions, practices, and the rationales behind their observed practices as well as factors influencing their practices. To complement the teacher-level data, semi-structured interviews were also conducted with the school principal and EFL head, providing institutional context and leadership perspectives.

Overall, multiple observations and interviews were conducted to capture variations in teaching practices and allow for deeper exploration of teachers' viewpoints. It also should be noted that the data collection took place over a six-month period that coincided with the COVID-19 pandemic. This context required adaptations to the original research design due to teachers' increased workload. Specifically, the initial plan to alternate between observations and interviews was modified to a block approach, where two classroom observations were conducted first, followed by two interviews. This modification was made in response to teachers' preferences to complete the interviews within a more concentrated timeframe, which better accommodated their busy schedules during the pandemic. The entire procedure is summarised in Figure 4.4.

Figure 4.4

Qualitative Data Collection Procedure for Each Case School



4.4.3 Semi-structured Interviews

This section explains the development and implementation of the semi-structured interviews, the primary method for qualitative data collection in this study. This section begins by justifying the choice of a semi-structured format, followed by a description of the process for designing interview questions. The section then outlines the pilot study undertaken to refine the questions and concludes with the procedure for conducting the interviews.

4.4.3.1 Rationale for Using Semi-structured Interviews. Interviews are an effective tool for delving into participants' unobservable thoughts, feelings, and the rationales behind their behaviours (Patton, 2014). For this study, a semi-structured format was chosen because this approach uses pre-prepared guiding questions but also allows the flexibility to ask spontaneous, probing questions to clarify or elaborate on points in an open and exploratory manner, thus enabling the collection of rich, detailed data (Dörnyei, 2007). Therefore, interviews were employed as the primary data source for the qualitative phase of this study.

4.4.3.2 The Design of Semi-structured Interview Questions. Three sets of semi-structured interview questions were developed for the study's key stakeholders: EFL teachers, heads of the EFL department, and school principals (see Appendices C, D, and E). Guided by the RQs 1, 2 and 3, the interview questions were designed to elicit in-depth insights into participants' perceptions, practices, and the factors influencing their technology use. To gather comprehensive data from the teachers, the interview process was structured into two rounds. The first interview focused on their general perceptions of technology (RQ1), while the second delved into their specific practices, rationales, and the influencing factors they experienced (RQs 2 and 3). In contrast, department heads and principals participated in a single interview session.

The interview questions for EFL teachers were designed with four key considerations: alignment with research questions, theoretical foundations, prior literature, and logical structure. Firstly, to understand teachers' perceptions of technology, the interview began with questions exploring their general attitudes and beliefs about using technology in the classroom. Guided by the TAM and UTAUT models, this section also probed their perceived ease of use and perceived usefulness of specific educational technologies.

Secondly, to examine teachers' actual practices, the interview covered topics related to their use of digital tools in lesson planning and classroom activities. Drawing on data from prior classroom observations, targeted questions were asked to encourage teachers to elaborate on their rationales and decision-making processes behind using specific technologies observed in class.

Finally, to identify the factors influencing their technology integration, the interview questions prompted teachers to reflect on both supportive and impeding factors. Informed by the literature (e.g., Hew & Brush, 2007), this part of the interview specifically addressed key areas such as professional training, institutional support,

and infrastructure access.

The interview questions were also structured to create a natural conversational flow and cover key aspects of each topic. The interviews began with introductory questions to gather background information about the participants (e.g., “Can you tell me about your teaching background...?”), which helped to contextualise their responses.

Following this, the main questions addressed the core topics of teachers’ perceptions, practices, and influencing factors. To explore these topics in depth and elicit richer insights, follow-up and probing questions were used throughout. For instance, a teacher could be asked, “Can you give an example of how you have used technology to achieve this?” or prompted to elaborate with, “Can you explain why you think this particular technology is more effective than others?”

Finally, in terms of the interview questions for EFL department heads and school principals, these questions were adapted from the EFL teacher interview questions but re-framed from the perspectives of the EFL head and the school principal. In addition, some background information about the school was included.

4.4.3.3 Pilot Study of the Interviews. Following the development of the interview questions, piloting was conducted to ensure their clarity, relevance, and suitability for Chinese primary school EFL teachers. The piloting involved three EFL teachers from a primary school in Hangzhou, who were not part of the final sample. During the pilot, I conducted mock interviews and collected feedback on the wording, comprehensibility, and relevance of the questions. Based on their feedback, minor adjustments were made, such as rephrasing ambiguous questions (e.g., “How do you feel about technology in teaching?” was revised to “Could you tell me about your experience using technology in your teaching?” to make it friendlier and to elicit more specific responses). This piloting process helped ensure that the interview questions were appropriate for the participants and capable of eliciting meaningful responses

aligned with the research objectives.

4.4.3.4 Interview Procedure. The semi-structured interviews were conducted as the final stage of qualitative data collection for each teacher, typically taking place within a week after the review of teaching plans and the classroom observations. As outlined in the design, teachers participated in two interview rounds. The EFL department head and the school principal each participated in a single, comprehensive interview session. All interviews were conducted in Chinese to allow participants to express themselves more freely and accurately. Each session typically lasted between 40 and 60 minutes.

4.4.4 Review of Lesson Plans and Classroom Observations

This section explains the rationale for incorporating the review of lesson plans and classroom observations, both of which were used to supplement the interview data. It first presents the rationale for incorporating these methods, then details the development of the observation protocol (see Appendix F). The section concludes by describing the procedure for conducting classroom observations.

4.4.4.1 Rationale for Reviewing of Lesson Plans and Using Observations.

Teaching plans are a document source in case studies (Yin, 20). While interviews served as the primary data source, the review of teaching plans and classroom observations provided crucial supplementary information that enhanced the study. These methods enabled a deeper understanding of the actual classroom context by documenting teachers' planned and actual use of technology, thereby addressing the inherent limitations of self-reported interview data (Merriam, 1998). The observations also served as a foundation for developing targeted follow-up interview questions (Merriam, 1998; Nunan & Bailey, 2009), which allowed for deeper exploration of the rationales behind teachers' technology choices, thus addressing RQ 2. Importantly, while these data sources were vital for providing context, areas to delve into in more

depth in the interviews, and another source of data alongside the interview data for triangulation, they were not included in the formal thematic analysis.

To illustrate how the observation protocol functioned as a tool to inform the subsequent interviews, a specific example is provided here. During one observed lesson, the teacher connected her laptop to a Seewo IWB. While introducing new vocabulary, she invited a student to come to the front of the class and use her laptop to look up a word, and the search result was then displayed on the IWB for the entire class to see. This observation directly generated a follow-up interview question about why the teacher chose to have a student perform the search rather than doing it herself, providing an opportunity to explore the underlying pedagogical decisions with the teacher.

4.4.4.2 The Development of Classroom Observation Protocol. The classroom observation protocol (see Appendix F) was developed based on a review of relevant literature and established observation instruments. To align with the research objectives, the protocol focused on capturing key aspects of the lesson, including a) Technology Use: documenting the types of technology employed (e.g., PPT, IWB); b) Instructional Activities: identifying specific technology-supported activities; and c) Student Responses: recording engagement and interactions with the technology.

4.4.4.3 Observation Procedure. In this study, each EFL teacher was observed for two lessons. These observations enabled me to gain enough insights into how they used technology in teaching, inform the interview questions, and enrich the findings from the teachers' interviews. The observations were conducted in a non-intrusive, non-participatory manner to minimise my impact and to alleviate any pressure the teachers might feel when being observed.

4.5 Data Analysis

This section outlines the approach used to analyse both quantitative and qualitative data in this study. Quantitative data from the teacher survey were analysed using descriptive statistics to examine trends, distributions, and relationships between variables. Qualitative data from the interviews were analysed using thematic analysis to identify patterns and themes in teachers' perceptions, use and influencing factors regarding technology use in class. Classroom observations and teaching plans were used as supplementary data sources to provide contextual insights and enrich the interpretation of the interview findings.

4.5.1 Quantitative Data Analysis

The quantitative data analysis process consisted of five stages. In the first stage, data were exported from the Sojump platform into an Excel file and converted from text to numerical values suitable for statistical analysis. The data were then imported into SPSS to establish a database, preparing it for further cleaning and analysis.

In the second stage, the dataset was cleaned and screened. After checking for completeness and errors, the data were also screened for unengaged responding, such as "straight-lining," where a participant provides identical or near-identical answers to a large block of questions (Krosnick, 1991). This screening identified two cases that exhibited this pattern. As these responses are considered unreliable and could potentially bias the results, these two cases were removed from the final dataset for analysis.

The third stage of the data analysis process involved selecting appropriate statistical tests. Given that the data in this study were ordinal, parametric statistical tests were not suitable, as they assume continuous data with normally distributed residuals (Field, 2024). Instead, non-parametric tests were selected, as they were more

appropriate for ordinal data and did not require assumptions about normality or homogeneity of variance. This stage was crucial for ensuring the reliability and validity of the results.

In the fourth stage, descriptive statistics were conducted for all questionnaire items, including the calculation of the mean, median, mode, interquartile range (IQR), first quartile (Q1, 25th percentile), third quartile (Q3, 75th percentile), and standard deviation (SD). For ordinal data, such as Likert-scale responses, the median, mode, and IQR are typically preferred measures because they effectively capture the central tendency and distribution of the data without assuming equal intervals between response categories. However, research suggests that treating Likert-scale data as interval data is acceptable when the response categories are evenly spaced and the sample size is sufficiently large (Norman, 2010). Therefore, in this study, the mean and standard deviation were also included to provide additional insights into the central tendency and variability of the data.

In addition, to visually present the findings, response distributions across the six questionnaire options (from strongly disagree to strongly agree) were displayed using stacked bar charts. Agreement levels among teachers were illustrated with boxplots. These visualisations offered a clear representation of key patterns in the data. Overall, this stage provided a general overview of EFL teachers' perceptions and use of technology. By highlighting key characteristics and trends, descriptive statistics served as a foundation for subsequent in-depth analysis.

In the fifth stage, two non-parametric tests, i.e., the Mann-Whitney U Test and the Kruskal-Wallis Test, were conducted to assess group differences, based on the results of the assumption tests. These tests were applied to examine variations across groups defined by demographic factors and self-reported technology use frequency. The Mann-Whitney U Test was used to compare the distribution of scores between two

independent groups, such as male versus female teachers (a demographic factor), and was suitable for ordinal or non-normally distributed data (Bryman & Cramer, 1992; Tolmie, 2011). To compare scores across multiple independent groups, such as teachers with various years of teaching experiences, the Kruskal-Wallis Test was employed, which was also appropriate for ordinal or non-normally distributed data (Tolmie, 2011). Identifying differences between these groups helped uncover factors that associated with teachers' use of technology in the classroom (Tolmie, 2011).

4.5.2 Qualitative Data Analysis

In this study, I primarily analysed semi-structured interview data, as they served as the main data source. Teaching plans and classroom observations were used as supplementary sources to support the understanding and interpretation of interview data. Although the observations and teaching plans were not systematically analysed, classroom observation data were also incorporated into the findings chapters to illustrate how teachers used technology in their lessons. This is because the classroom observation data provided additional context and, together with the interview data, contributed to a more comprehensive depiction of teachers' use of technology in the classroom.

The semi-structured interview data were analysed using a thematic analysis approach. This approach, as an interpretive method, helps identify patterns and themes in qualitative data (Patton, 2014). It is particularly useful for understanding the deeper realities behind participants' experiences and perceptions (Braun & Clarke, 2022). Therefore, thematic analysis was deemed suitable for this study, as it allowed for the identification of patterns in how participants perceived technology, how they used it in their teaching, and how their perceptions and practices were shaped by contextual factors.

The analysis followed Braun and Clarke's (2022) six-step guide: a) familiarisation

with the data; b) creating initial codes; c) identifying potential themes; d) reviewing and refining themes; e) defining and naming themes; and f) writing the report. Notably, this process was not strictly linear, as researchers often moved back and forth between steps (Braun & Clarke, 2022). The following paragraphs outline how codes were generated and how themes were developed using the six-step approach.

It is worth noting that to ensure I was working with what the participants actually voiced, the initial coding of the data was conducted in Chinese. The illustrative quotes from the interviews were translated into English during the writing stage for presentation.

4.5.2.1 Familiarisation with Data. After data collection, I transcribed all the interview recordings. This task involved listening to the recordings multiple times and carefully reviewing the transcripts. Through this process, I became familiar with the data.

4.5.2.2 Generating Initial Codes. In this stage, initial codes were generated by identifying recurring patterns from the raw data (Bryman, 2012). An inductive approach was used, meaning that initial codes were developed directly from the content of the data rather than being guided by a preexisting coding framework (Braun & Clarke, 2013).

Following Braun and Clarke's (2013) recommendations for high-quality coding, which emphasise systematically capturing meaning beneath the surface of participants' words, I conducted a detailed, line-by-line reading of the transcripts. To organise the data systematically, I created a two-column table: the left column contained assigned codes, and the right column listed corresponding data excerpts from the transcripts. Each row represented a coded segment, ensuring transparency in how the codes were derived from the raw data. A preliminary coding framework was

developed based on initial readings of the data and served as a flexible guide during the analysis. Throughout the process, I regularly revisited previously coded segments to ensure consistency in capturing similar meanings, adapting the framework as new insights emerged. A sample segment of the coding table is shown in Figure 4.5.

Figure 4.5

Mapping of Codes to Data Segments

观摩过科学公开课的同步软件, 未用	其实有一些软件, 偶尔可能也会用一下。就我现在还没有用过, 我知道像有些软件是可以同步的, 比如说, 些软件也有。我以前听课的时候, 看他们科学用过, 挺神奇的。它有一块白板, 比方说, 你在这个白板上写上。
看到班主任使用班级管理大师加分软件, 未用	就有一些软件吧, 包括他们班主任会用那个加分软件, 就是几个同学表现好, 马上可以加分。除了希沃白板是说, 可以尝试一下, 了解一下。
备课教育技术: 互联网(下载录音), 配音生成器(自制录音)	平时教学的时候, 会用到一些辅助性的软件, 就是不是直接体现在我讲课, 而是体现在我备课的过程中, 吗? 需要用着录音, 这些录音的材料的时候很难找, 我不一定能找到合适的录音, 就是说我可以自己做, 跟这种原汁原味的口语, 还是有点区别的, 所以为了有那个原汁原味的口语, 我就用那种成配音生成软件, 较原汁原味这种口语。(那如果你的ppt里面有那种动物的叫声, 这种是您下载的吗? 还是自己制作的?) 一般都是下载的。
自制视频	学生接触到的可能还是以音频, 视频和希沃白板为主, 然后也会有一些这种软件的东西, 就是希沃白板, 相说, 还是刚才说这种加分系统啊这样的。我们目前用到的比较多的就是希沃白板, 其他的软件可能在英语然后刚刚你说那个就是动物的声音, 我觉得这也是跟我们一样, 就有时候, 有些声音我也会自己录, 比如说时候你课本人物的话, 像这个我们的教材里不是有一只熊吗, 那只熊的声音, 是我们可以模仿的, 你要去网多, 所以我们会自己配。但总的来讲, 还是以下载为主。我自己弄的这种声音是很少的, 就是用手机录, 件, 然后放在课件, 然后我们现在上公开课, 那天你也听了, 就那个老师的“how to send an email”她也是自那种输入性的材料, 比方说像那个老师, 他想要一个怎么制作邮件的过程? 那你像网上找全英文的视频, 又
学生接触到的技术: 音频, 视频, 希沃白板, app(班级管理大师)	
备课教育技术: 手机(自己模仿的音频), 录视频, 录屏软件(自制视频)	

Figure 4.5 provides a sample of the coding process. The left column lists the developed codes, while the right column shows the corresponding data excerpts from the interview transcripts. The codes illustrated here include technologies used by the teacher for lesson preparation, those that students are exposed to in the classroom, and those the teacher has observed in other colleagues' lessons.

As Terry et al. (2017) noted, the analytical approach is not a strictly linear process, and the “researcher often moves back and forth between the different phases” (Terry et al., 2017, p.23). The first round of coding focused on identifying basic descriptive information about participants, their context, and explicit beliefs or values directly related to the research questions. In subsequent rounds, analysis moved beyond surface-level interpretations. Teachers' attitudes, their pedagogical uses of technology, and the underlying reasons behind their choices, many of which were not explicitly stated in their narratives, were identified and coded at a deeper level. Through this iterative process, coding progressed from descriptive labelling to uncovering the

implicit meanings embedded in participants' responses, allowing for a more nuanced understanding of how they conceptualised and used technology in their teaching.

At times, during this process, discerning the deeper meanings behind teachers' statements beyond their surface-level expressions proved to be a challenge. For example, one teacher stated, “对呀，就是 PPT 版，白板，给他们创造一个情景吧，把书本内容搬到黑板上。” (“Yes, the PPT and the IWB create a scenario for them and display the textbook content on the blackboard.”). Initially, I interpreted “把书本内容搬到黑板上” (“display the textbook content on the blackboard”) as only a statement about how the teachers used technology to support teaching. However, through multiple rounds of coding, reviewing the rest of the interview data from this teacher, and triangulation with classroom observation data, I realised that this statement also reflected the teacher's perception of technology primarily as a presentation tool.

4.5.2.3 Searching for themes. The third step involved constructing themes by grouping and integrating similar codes and coded data into broader categories. This process was guided by the principle of identifying patterns that “look alike” (Lincoln & Guba, 1985). For example, codes like “using technology to support group work” and “using technology to support peer assessment” were combined under the sub-theme of technology-supported collaborative learning, as both reflected the role of technology in facilitating student collaboration.

After establishing categories and sub-themes, I examined how they could be integrated to form overarching themes. To achieve this, I documented my interpretations regarding the relationships between different codes, categories, and sub-themes. For instance, I observed that categories such as “teachers valuing pedagogical knowledge over technological knowledge,” “prioritising teaching approaches over technology use,” and “viewing technology as a delivery tool” all

focus on teachers' beliefs about technology's function and role in teaching. Because they shared this conceptual focus, they were grouped together to form a coherent theme. During this process, I used X-Mind (2024), a mind-mapping software, to facilitate the organisation of categories and sub-themes. X-Mind allowed me to freely move and rearrange the categories and sub-themes, visually mapping their relationships and constructing the themes more effectively. An example of a thematic map developed during this process is presented in Figure 4.6 to illustrate how codes were clustered into sub-themes.

Figure 4.6

Example of Codes Clustered into a Sub-theme



Following Braun and Clarke (2022), I referred to these as “candidate themes”, as they required further refinement and validation. These themes were not finalised at this stage; they were reviewed and adjusted throughout the analysis to ensure their relevance and alignment with the research questions.

This study employed an inductive approach to thematic analysis, allowing themes and sub-themes to be derived directly from the data of each case school. To maintain analytical rigor, the study was guided by Stake's (2013) principle that each key finding must be supported by at least three confirmations. This ensured that important meanings were not overlooked and that interpretations were firmly grounded in the collected data. Themes and sub-themes were only developed in areas where the data

were sufficiently rich and robust. Consequently, not all potential themes were pursued if the supporting evidence was insufficient. While there were similarities across the three schools, the themes and sub-themes were not entirely identical, reflecting the unique teaching practices with technology in each case. This data-driven approach minimised the imposition of preconceived notions and ensured that the analysis remained closely rooted in empirical evidence. To provide a clear overview of the themes identified for each case school, the theme maps for three schools are included in Appendices G, H, and I, respectively.

4.5.2.4 Reviewing, defining and naming themes. In the fourth and fifth steps, I reviewed and refined the candidate themes by re-reading the dataset and evaluating their relevance to the research questions. This process involved assessing whether each theme accurately represented the data and adjusting them as needed. I then defined the themes more precisely, refined their descriptions, and reorganised their order to enhance coherence and readability in the analysis.

To enhance the trustworthiness and credibility of the themes (Lincoln & Guba, 1985), I engaged in discussions with my supervisors during supervision meetings. I presented my themes and sub-themes, and through these collaborative discussions, I reflected on whether the content of the data excerpts aligned with the interpretations I had developed. This process helped me refine my analysis and ensure that the themes accurately represented the data.

In addition, after developing the themes, I reviewed the observation data to further support and exemplify the identified themes. For instance, the theme of “teachers viewing technology as useful for students’ collaborative learning” was reinforced by classroom observations where teachers used PPT and IWB to support students’ group work; this observed practice aligned with what teachers had stated in their interviews. This process of cross-referencing the observation data with the themes ensured that

the findings were grounded in both the participants' perspectives and their actual classroom practices, enhancing both the consistency and dependability of the results (Lincoln & Guba, 1985).

In addition to developing themes, I analysed the factors influencing teachers' use of technology in each case school, drawing on the interview data. This process involved identifying recurring factors within the coded data, such as teachers' technology efficacy and national policies on technology use. This analysis of factors was conducted for each case school and is discussed in detail in the respective case chapters, with a synthesis of related findings presented in the cross-case analysis.

4.6 Combining Data and Findings

This section discusses the process of integrating data from multiple sources to provide a comprehensive understanding of the findings. It consists of two parts: cross-case analysis, which identifies patterns and differences across cases, and triangulation, which combines both quantitative and qualitative findings to provide deeper and more comprehensive insights. The following sections outline the analytical approaches used in each part.

4.6.1 Cross-case Analysis

First, the themes and sub-themes that emerged from the three schools were systematically compared to identify patterns across cases. This process involved creating a comprehensive overview of all themes identified in each school and examining their frequency and significance across the dataset.

Based on this comparison, key themes were then identified for cross-case analysis. These themes were selected not only because they appeared frequently across the three case schools, making them central to the cross-case analysis, but also because

some less frequent themes were deemed significant for understanding unique contextual factors in specific schools. For example, while a theme like “teachers consider technology useful for fostering student engagement and motivation” was prominent across all three schools, a theme such as “technology is useful for supporting teachers’ teaching” was identified in only one school but was included due to its relevance to the research questions. This approach ensured a comprehensive analysis that captured both common patterns and unique insights across the cases.

To facilitate cross-case comparison, findings related to each theme were then consolidated into a comparative table, such as the example shown in Table 4.6. This illustrative table demonstrates how similarities and differences were examined across cases, helping to identify common patterns and case-specific variations.

Table 4.6

Example of a Comparative Table: Theme 1 across the Three Case Schools

Theme 1 (the role of technology in teaching)		
Case 1	Case 2	Case 3
Being aware of both the advantages and disadvantages of technology (distraction).	Being aware of both the advantages and disadvantages of technology (distraction).	Being aware of both the advantages and disadvantages of technology (supporting lesson preparation, improving teaching efficiency).
Viewing technology as a delivery tool	Mixed views because of knowledge	Technology use is considered necessary in teaching.

Theme 1 (the role of technology in teaching)		
Lesson design and teaching methods mattered more than technology use, and teachers' professional knowledge more important than technological knowledge.	Teaching approach and lesson design informed the use of technology, and pedagogical knowledge held greater significance.	Technological knowledge as no less important than pedagogical knowledge

After these patterns were established, the next stage focused on analysing potential reasons for the observed similarities and differences. This analysis involved examining the influencing factors that had been identified within each case school during the individual analyses to provide a deeper contextual understanding. For instance, if the cross-case analysis revealed that teachers at School A used technology more frequently for interactive activities than teachers at School B, I would compare the relevant factors from both schools such as access to technical support and teacher training programs to construct an explanation for this difference. Finally, this explanation would be summarised within the discussion of the relevant theme.

4.6.2 Combining Quantitative and Qualitative Findings

This section describes the process of integrating the quantitative and qualitative findings, a key feature of the convergent parallel mixed-methods design employed in this study. According to Creswell and Plano Clark (2017), the primary purpose of integration in this design is to gain a more comprehensive and nuanced understanding of a phenomenon by merging two different but complementary datasets.

First, I looked at the key findings from both the quantitative and qualitative analyses. For example, the quantitative data reported the frequency of teachers' use of technology in teaching, and the qualitative data revealed how teachers used technology and what challenges they faced.

Next, I connected the quantitative findings with the qualitative findings. For instance, I compared the quantitative findings on “use of technology for feedback” with the qualitative findings on “how teachers used technology for assessments.” This helped me see if one type of data supported or added something new to the other. This alignment or complementary nature of data types allows researchers to uncover richer insights from the findings (Duff, 2008).

Sometimes, there was only quantitative data or only qualitative data for a specific finding. For example, I had quantitative data on the relationship between the frequency of technology usage and teachers’ reporting of actual use of technology, but no qualitative data on this. In such cases, the quantitative finding was presented on its own, and its meaning was then interpreted. Similarly, in instances where only qualitative data from interviews or observations supported a theme, I presented the qualitative finding independently and provided an in-depth interpretation of its implications. This approach is consistent with Duff’s (2008) recommendation to acknowledge the limitations of data availability while leveraging the strengths of each data type, thereby effectively responding to my research questions.

4.7 Ethical Considerations

Any research relies on participants to voluntarily participate, provide information, and authorise the use of data in subsequent research publications. Researchers, in turn, have an obligation to protect participants from any negative impacts that may arise from their involvement in the research. Therefore, addressing ethical issues is crucial for researchers. This study strictly adhered to the Massey University Code of Ethical Conduct for Research, Teaching, and Evaluations involving Human Participants, developed by the Massey University Human Ethics Committees (2017), and the project was recorded as low risk through the university’s ethics notification system. Three key ethical principles were seriously considered and addressed, including

informed and voluntary consent, avoidance of harm, and anonymity and confidentiality. These principles are elaborated on in the following paragraphs.

First and foremost, all participants were well informed and recruited on a voluntary basis. For the online survey, it was clearly stated at the beginning of the questionnaire that completing it implied consent. Participants were free to choose whether to complete the survey or not, ensuring their participation was entirely voluntary. For the case studies, I first obtained school-level permission by sending the Information Sheet and Consent Form in Chinese to the schools, ensuring the school administrators understood my project and its requirements before granting approval. Upon receiving the schools' permission, I then provided the Information Sheet and Consent Form in Chinese to individual participants (school principals, EFL heads and EFL teachers), so they understood my project and what it entailed. The information sheet made it clear that their participation was voluntary and that they had the right to decline participation before the research began or withdraw at any time during the course of data collection. Sample copies of the school-level Information Sheet, Consent Form, teacher Information Sheet, and teacher Consent Form (both English and Chinese versions) are included in Appendices J, K, L, M, N, O, P and Q for reference. Gifts valued at 100 RMB (approximately 24 NZD) were given to the EFL teachers and EFL head as a token of appreciation for their time and effort.

In addition, confidentiality was assured. For the questionnaires, identifying numbers were utilised instead of names. Demographic data were minimised and only information pertinent to the research questions was collected to prevent the identification of respondents. In the qualitative study, pseudonyms were assigned to all participants and case schools to respect their privacy. The names of the classrooms were not mentioned in the study, and the case schools, EFL teachers, EFL heads, and principals are not identifiable from the way the thesis is written. Only the researcher and supervisors had access to the transcribed data and codes.

Furthermore, all participants were carefully protected from harm. I made it clear to all participants that my focus was solely on understanding how they perceived technology, how they integrated technology into their classrooms, and what factors influenced their use of technology. I also assured them that I would not evaluate their teaching effectiveness or judge their instructional practices or any other aspect of their work. In addition, throughout the data collection process, I did not share information about any participant with other EFL teachers, EFL heads, or school principals.

Furthermore, during classroom observation, I remained quietly in the corner of the classroom and did not interrupt the teachers' instruction to minimise any discomfort for the teachers and students due to the observation. Also, no video recordings of teaching practices or audio recordings of classroom dialogue were made, ensuring that participants felt at ease. In sum, all these measures were designed to minimise potential risks and ensure participant well-being throughout the study.

4.8 Chapter Summary

This chapter presents the methodology and methods adopted in this study, which were designed to address the gaps identified in the literature review (Chapter 2). It described the overall research design: a convergent parallel mixed-methods approach with two research phases. The quantitative phase utilised a questionnaire survey to explore Chinese primary school EFL teachers' perceptions and use of technology (addressing RQs 1, 2 and 3), providing a broad overview across a larger sample. The chapter explained the questionnaire development, data collection using an online survey tool, and analysis using descriptive statistics and non-parametric tests. The qualitative phase involved case studies of three primary schools with 15 EFL teachers, three EFL heads, and three school principals to examine teachers' technology perceptions, practices, and influencing factors (addressing RQs 1, 2, and 3). Data collection methods included semi-structured interviews, classroom observations, and

teaching plan reviews, analysed through thematic analysis and cross-case comparisons. The chapter also outlined the integration of quantitative and qualitative findings, which helped to provide a more comprehensive understanding of the target phenomena. Finally, it discussed ethical considerations and how they were addressed to protect participants according to Massey University's Code of Ethical Conduct.

Chapter 5 Questionnaire Findings

5.1 Introduction

This chapter presents the findings from the questionnaire (n=244), which provides a general overview of Chinese primary school EFL teachers' perceptions and use of technology for this study. The questionnaire comprises six demographic questions and 31 question items. The demographic questions cover participating teachers' gender, age, years of teaching experience, frequency of technology use, school type, and school area. Questionnaire items captured teachers' perceptions and use of technology, with responses recorded on a six-point Likert scale to capture the teachers' levels of agreement.

In this chapter, descriptive statistics are employed to investigate the teachers' perceptions and use of technology. In addition, statistical tests are utilised to compare demographic groups to examine how their demographic characteristics influence their perceptions and use of technology. To ensure clarity, all statistical measures, tests, and visualisations are explained in detail upon their first appearance. This analysis identifies demographic characteristics that are significantly associated with teachers' perceptions and use of technology. Accordingly, only statistically significant results are reported. For example, as age was not found to be a statistically significant variable associated with teachers' perceptions and use of technology, the results of this analysis are not shown here. Some important variables may not have significant results due to imbalances in the sample (see Table 4.2).

This chapter begins with the teachers' perceptions of technology, followed by their perceptions of the affordances of technology. It then discusses teachers' perceptions of the constraints of technology and concludes with their use of technology in teaching. This organisation mirrors the structure of the questionnaire that contains four different

sets of questions. In addition, this organisation facilitates logical progression from general perceptions to specific uses. Importantly, throughout the chapter, the data presented reflects teachers' self-reported perceptions and usage, rather than observations of their practices.

5.2 Teachers' Perceptions of Technology

This section concerns teachers' perceptions of technology. It begins with an introduction to all items in this part of the questionnaire, followed by a comparison of the items' descriptive statistics, and concludes with four findings. The first finding is that teachers report greater confidence in adopting technology in their teaching in general terms, compared to their confidence in integrating it into specific, pedagogical practices, like using technology for individual learning and group work. In addition, teachers report that using technology to organise individual learning activities and manage student group work is more challenging compared to other tasks discussed in this section. Furthermore, teachers newer to teaching tend to find it easier to use technology to manage student group work compared to those who have been in the profession longer. Finally, teachers who frequently use technology are more likely to feel it is useful and easy to use technology. They also exhibit higher levels of technology self-efficacy, hold more positive attitudes, and intend to use it more in the future than teachers who use technology less frequently.

5.2.1 Basic Item Information

This section discusses Items 9-20 and 24 of the questionnaire, with further details provided in Table 5.1. To address RQ1, these items assess various dimensions of teachers' perceptions, including perceived usefulness and ease of use of technology, positive attitudes, self-efficacy, beliefs about its impact on student learning, and future usage intentions. The descriptive statistics for these items are displayed in Table 5.2, while Figure 5.1 illustrates the response distribution for each item.

Table 5.1*Teachers' Perceptions of Technology Items*

No	Item
9	Digital technology is useful for my teaching.
10	Digital technology helps me teach more effectively.
11	It is easy to design learning activities that incorporate digital technology.
12	Digital technology is easy to use in my teaching.
13	I am interested in using digital technology in my class.
14	I enjoy using digital technology in my teaching.
15	I am confident in preparing lessons with the support of digital technology.
16	I feel confident in using digital technology in my teaching.
17	I believe using digital technology will improve students' learning.
18	I believe that digital technology makes my teaching job easier.
19	I feel using digital technology to organise individual learning activities in class is easy.
20	I feel using digital technology to manage students' group work in class is easy.
24	I intend to use digital technology more in my class in the future.

Table 5.2*Descriptive Statistics for Perception Items*

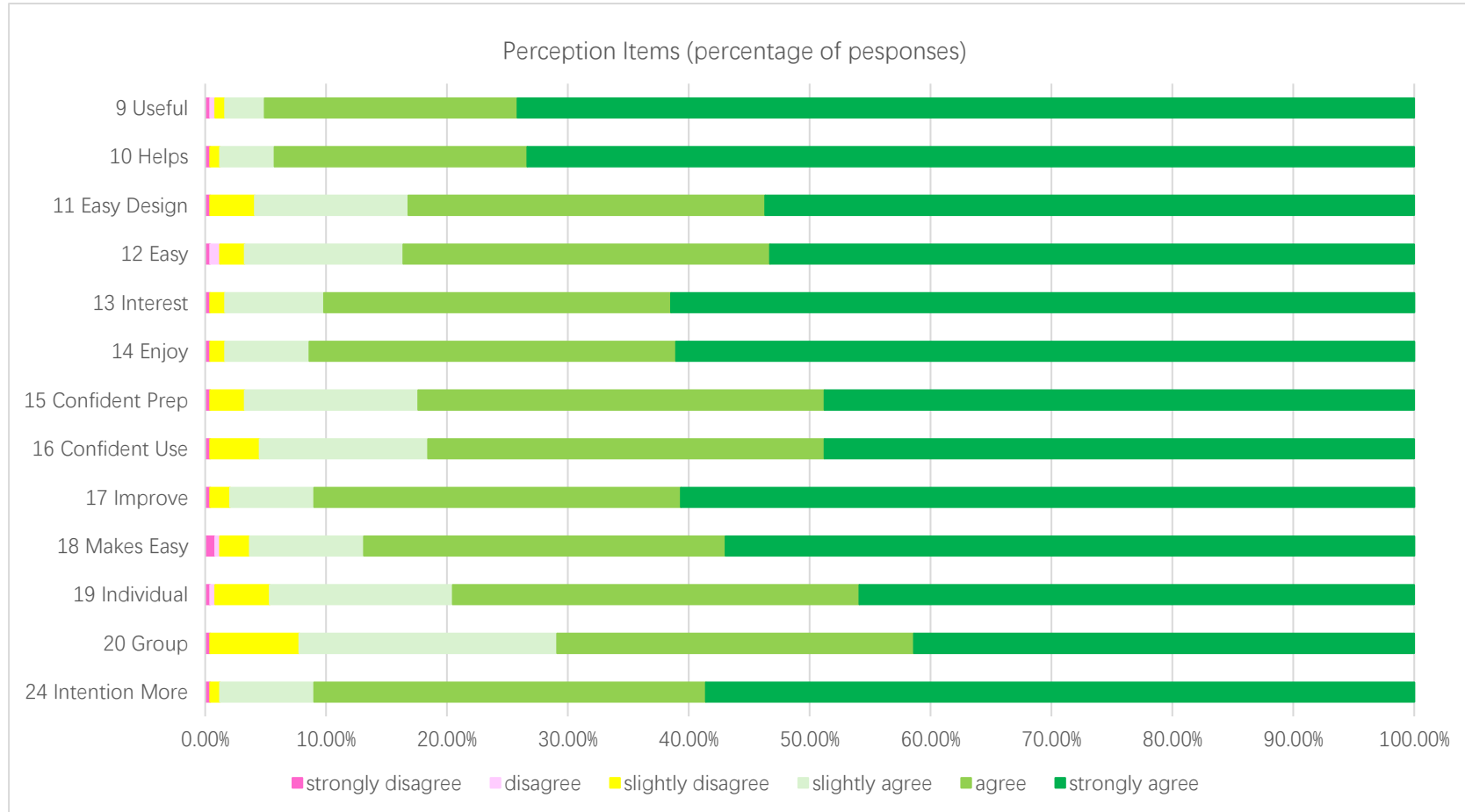
Item	Mean	SD	Min	Q1	Median	Q3	Max	IQR	Mode	Mode N
9 Useful	5.66	0.69	1	5	6	6	6	1	6	181
10 Helps	5.65	0.67	1	5	6	6	6	1	6	179
11 Easy Design	5.32	0.88	1	5	6	6	6	1	6	131
12 Easy	5.32	0.89	1	5	6	6	6	1	6	130
13 Interest	5.49	0.76	1	5	6	6	6	1	6	150
14 Enjoy	5.50	0.74	1	5	6	6	6	1	6	149
15 Confident Prep	5.27	0.86	1	5	5	6	6	1	6	119
16 Confident Use	5.25	0.89	1	5	5	6	6	1	6	119
17 Improve	5.49	0.76	1	5	6	6	6	1	6	148
18 Makes Easy	5.38	0.89	1	5	6	6	6	1	6	139
19 Individual	5.19	0.93	1	5	5	6	6	1	6	112
20 Group	5.04	1.00	1	4	5	6	6	2	6	101
24 Intention More	5.48	0.73	1	5	6	6	6	1	6	143

*Note.*SD = Standard Deviation (a measure of dispersion); Q1 = First Quartile (25th percentile); Q3 = Third Quartile (75th percentile);

IQR = Interquartile Range (Q3 - Q1, a measure of statistical spread)

Figure 5.1

Single Stacked Bar Chart of Teachers' Perceptions of Technology (ordered by item number)



5.2.2 General Trend and Item Comparison

The descriptive statistics reveal a consistent pattern: teachers highly agreed with all the items (mean > 5, mode=6), with low variability in their viewpoints (standard deviation < 1). However, despite the general trend, teachers' agreement levels vary slightly across specific items, reflecting slight differences in their perceptions of various aspects of technology in teaching.

Teachers strongly agreed that technology is useful in their teaching, as the items about technology being useful (Item 9) and technology helping teachers' teaching (Item 10) received the highest level of agreement (mean > 5.65, out of a total score of 6).

Additionally, teachers had positive attitudes toward technology and believed it can improve students' learning, given that their agreement levels on items about teachers' interest and enjoyment of technology (Items 13 and 14) and technology improving learning (Item 17) were slightly lower than those for the highest-ranked items but still very high (mean > 5.4).

Next, some teachers may find using technology for designing learning activities and teaching somewhat less easy (Items 11 and 12) and may not be totally convinced that technology makes their job easier (Item 18), as their agreement levels on these items are slightly lower compared to the previous items. However, as the means for these items are still above 5.32, this suggests that most teachers still felt that using technology to design learning activities and teaching is easy, and that technology helps make their job easier.

Furthermore, some teachers may feel less confident using technology for lesson preparation and teaching (Items 15 and 16) compared to the above-mentioned items, as their agreement on these two items is the second lowest in this section of the questionnaire. However, as the means for both items are still above 5.25, this indicates that most teachers still felt confident in using technology for these purposes.

Finally, some teachers found it challenging to use technology for organising individual learning activities and managing group work in class (Items 19 and 20), as they expressed the least agreement with these two items in this section of the

questionnaire.

To present the trend in an alternative way, a box plot is shown in Figure 5.2. The box spans from the first quartile (Q1) to the third quartile (Q3) of the data, representing the range (interquartile range, IQR) within which the middle 50% of agreement levels fall. This reflects the variability of the data. From the data, all items have their Q3 equal to the maximum value of 6. The first 12 items have a Q1 of 5, resulting in an IQR of 1. For the last item, Q1 is 4, leading to an IQR of 2. These low IQR values suggest that teachers' viewpoints exhibit low variability.

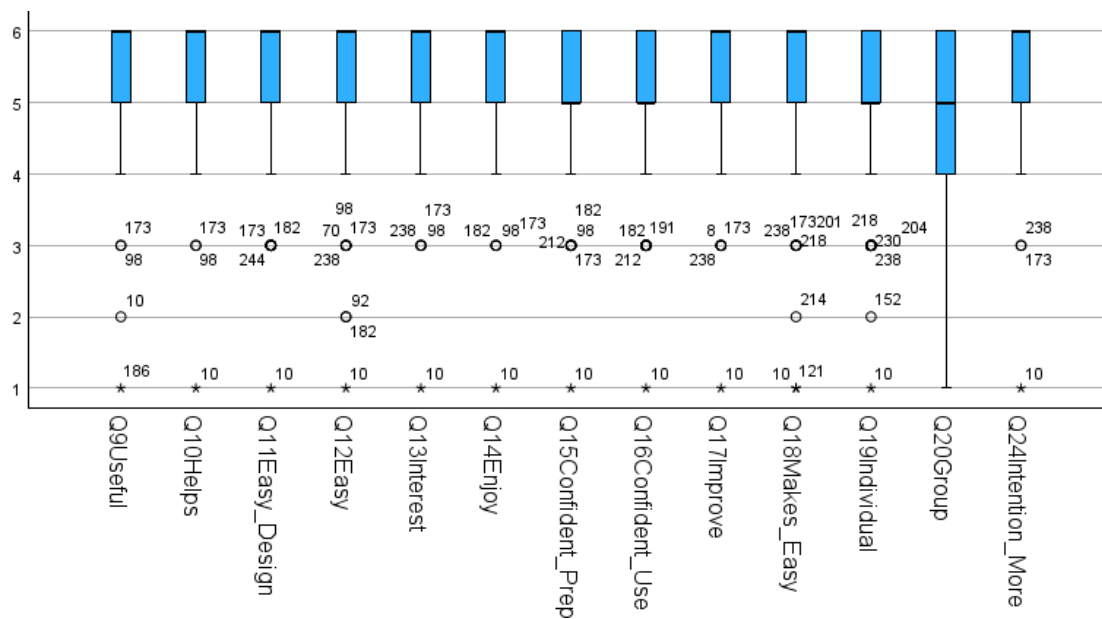
The line inside each box represents the median agreement level (the middle value) for each item. It indicates the central tendency of the dataset. In the box plot, the median for the first nine items is 6, while for the last four items it is 5, suggesting that the teachers' agreement levels for the last four items are lower than the first nine items.

The box plot whiskers extend from the edges of the box to the minimum and maximum values that fall within 1.5 times the interquartile range (IQR) from the lower and upper quartiles. This means that any data points beyond this range are considered potential outliers and are typically plotted as individual points. In the box plot, the upper whiskers of all items overlap with the maximum value of 6. The lower whiskers for the first 12 items are at 4, while for the last item it is at 1, indicating a higher variability in teachers' opinions for this item.

Lastly, the outliers, points outside the whiskers, are individual agreement levels that are significantly higher or lower than the rest of the data. In the box plot, the outliers reveal that a few participants held negative views across multiple items. For example, respondent 10 appears 12 times, respondent 173 appears 10 times, and respondent 98 appears 6 times in the outliers, indicating that these three participants held consistently negative views across different items.

Figure 5.2

Box Plot of Perception Items (ordered by item number)



5.2.3 Teachers' Readiness to Adopt Technology vs. Effectively Integrate it

The results of the item comparison show that teachers generally had a positive attitude towards technology (Item 13 Interest, mean=5.49; Item 14 Enjoy, mean=5.49), while they demonstrated slightly lower levels of technology self-efficacy (Item 15 Confident Prep, mean=5.27; Item 16 Confident Use, mean=5.25). They also reported finding it less easy to use technology for teaching (Item 11 Easy Design, mean=5.32; Item 12 Easy, mean=5.32). In addition, teachers had more positive responses to general questions about the role of technology (Item 9 Useful, mean=5.66; Item 10 Helps, mean=5.65), compared to more specific questions about using technology, like using technology for individual learning (Item 19 Individual, mean=5.19) and group work (Item 20 Group, mean=5.04). These two items had the lowest level of agreement. This suggests that while teachers are willing to adopt technology in general, they are less prepared to integrate it into their teaching in more specific ways, such as to support individual and group learning. This will be explored further in the qualitative findings chapter, which will provide context and deeper insights into this phenomenon.

5.2.4 Relationship Between Years of Teaching Experience and Managing Student Group Work with Technology

The K Independent Samples Test (Kruskal-Wallis Test) reveals that there is a relationship between teachers' years of teaching experience and their use of technology to manage student group work. The Kruskal-Wallis Test is used to compare the distributions of scores across multiple groups when data do not meet the assumptions of parametric tests, such as when data are ordinal or non-normally distributed (Tolmie, 2011), as is the case in this study. The results indicate a significant difference in responses to Item 20 across teachers with different years of teaching experience ($p < 0.039$) (see Appendix R).

In the original questionnaire, "years of teaching experience" has seven categories: <5, 5-10, 11-15, 16-20, 21-25, 26-30, and > 30 years. However, the number of respondents in the categories 21-25, 26-30, and > 30 years is limited (with 29, 9, and 2 respondents, respectively). To minimise statistical errors, "years of teaching experience" are regrouped, as shown in Table 5.3, although the responses are still very imbalanced.

Table 5.3

Teacher Numbers across Years of Teaching Experience

Year Range	N
10 years and less	129
11-20	75
Over 20 years	40

The pairwise comparison result shows a difference between two levels of years of teaching experience ($p = 0.036$). As seen from Table 5.4 and Figure 5.3, the mean and median are higher for the "10 years and less" than the "Over 20 years." The finding suggests that teachers who have taught for less than 10 years perceive that using technology to manage students' group work is easier than those who have taught for over 20 years. The qualitative findings will explore the potential reasons as to why different teacher groups vary in their use of technology for group work.

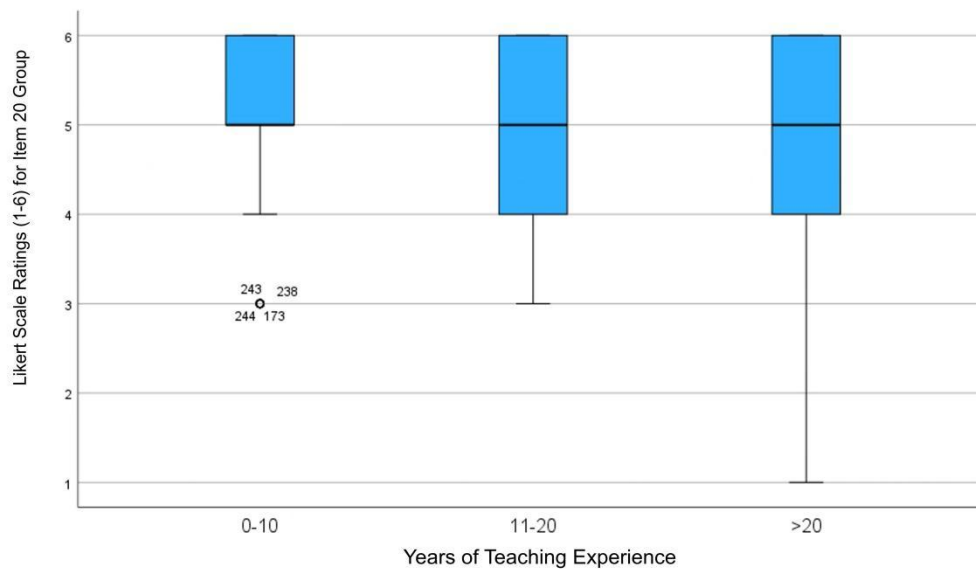
Table 5.4

Descriptive Measures of Two Levels of Teaching Experience

Item	Category	Mean	Median	SD
20 Group	10 years and less	5.17	5	0.92
	Over 20 years	4.65	5	1.21

Figure 5.3

Box Plot of Item 20 across Different Years of Teaching Experience



5.2.5 Relationship Between Technology Use Frequency and Teachers' Technology Perceptions

Two Independent Samples Test (Mann-Whitney U test) reveals that the frequency of technology use during lessons is associated with teachers' perceptions of technology. Like the Kruskal-Wallis Test, which compares the distributions of scores between multiple independent groups when the data do not meet the assumptions of parametric tests (Cramer, 1994; Tolmie, 2011), the Mann-Whitney U test here is specifically used to compare only two samples rather than multiple groups. The results reveal a significant difference in all items across frequency of technology use ($p < 0.01$) (see Appendix S).

In the original questionnaire, technology use frequency has five categories: never, seldom, sometimes, often, and always. However, the number of respondents in the categories of never, seldom, and sometimes is limited (with 0, 8, and 28 respondents, respectively). To minimise statistical errors, technology use frequency was regrouped as shown in Table 5.5, although the responses are still imbalanced.

Table 5.5

Teachers Number across Technology Use Frequency during Lessons

Frequency of use	N
Less often	36
Often	208

The pairwise comparison result regarding frequency shows that there is a difference between two levels of frequency. As seen from Table 5.6, the mean and median are higher for the “Often Use Technology” compared to the “Less Often Use Technology.” The results show that teachers who often use technology tend to feel it is more useful and easier to use. They may have more positive attitudes towards it, feel more confidence in using it, and intend to use it more in the future. These perceptions could, in turn, encourage greater use of technology, potentially creating a positive feedback loop.

Table 5.6

Descriptive Measures of Two Levels of Technology Use Frequency

Item	Category	Mean	Median	SD
9 Useful	Less often	5.22	5	0.72
	Often	5.74	6	0.65
10 Helps	Less often	5.08	5	0.77
	Often	5.75	6	0.60
11 Easy Design	Less often	4.78	5	0.87
	Often	5.41	6	0.85
12 Easy	Less often	4.67	5	0.99
	Often	5.43	6	0.82
13 Interest	Less often	4.92	5	0.84
	Often	5.59	6	0.70

Item	Category	Mean	Median	SD
14 Enjoy	Less often	4.92	5	0.80
	Often	5.60	6	0.68
15 Confident Prep	Less often	4.61	5	0.87
	Often	5.38	6	0.81
16 Confident Use	Less often	4.61	5	0.93
	Often	5.36	6	0.84
17 Improve	Less often	4.92	5	0.81
	Often	5.59	6	0.70
18 Makes Easy	Less often	4.92	5	0.84
	Often	5.46	6	0.87
19 Individual	Less often	4.58	5	1.03
	Often	5.29	6	0.87
20 Group	Less often	4.47	5	1.03
	Often	5.13	5	0.96
24 Intention More	Less often	5.03	5	0.74
	Often	5.55	6	0.71

5.3 Teachers' Perceived Affordances of Technology

This section addresses teachers' perceptions of the affordances of technology. It begins with the introduction of all items within this part of the questionnaire, followed by a comparison of the items' descriptive statistics. Finally, three key findings are reported. The first finding is that teachers tend to agree less on three affordances of technology: supporting student collaborative learning, improving student learning performance, and facilitating student concentration. In addition, there is a significant association between teachers' frequency of using technology in teaching and their perceived affordances of technology. These positive perceptions may, in turn, encourage greater use of technology. It was also found that teachers from different school types have differing perceptions regarding the extent to which technology can be used to support collaborative learning.

5.3.1 Basic Data Information

To understand teachers' perceptions of technology (RQ 1), this section examines eight potential affordances of technology in EFL teaching. This part of the questionnaire encompasses Items 25 through 32, including enabling multimodal resources to be presented (Item 25), motivating student learning (Item 26), aiding student concentration (Item 27), making classes more interesting (Item 28), supporting collaborative learning among students (Item 29), enhancing class interactivity (Item 30), facilitating student understanding (Item 31), and improving student academic performance (Item 32). Table 5.7 presents the eight items, while Table 5.8 displays the descriptive statistics. Additionally, Figure 5.4 illustrates the distribution of the six response options for each of these eight items.

Table 5.7

Teachers' Perceived Affordance Items

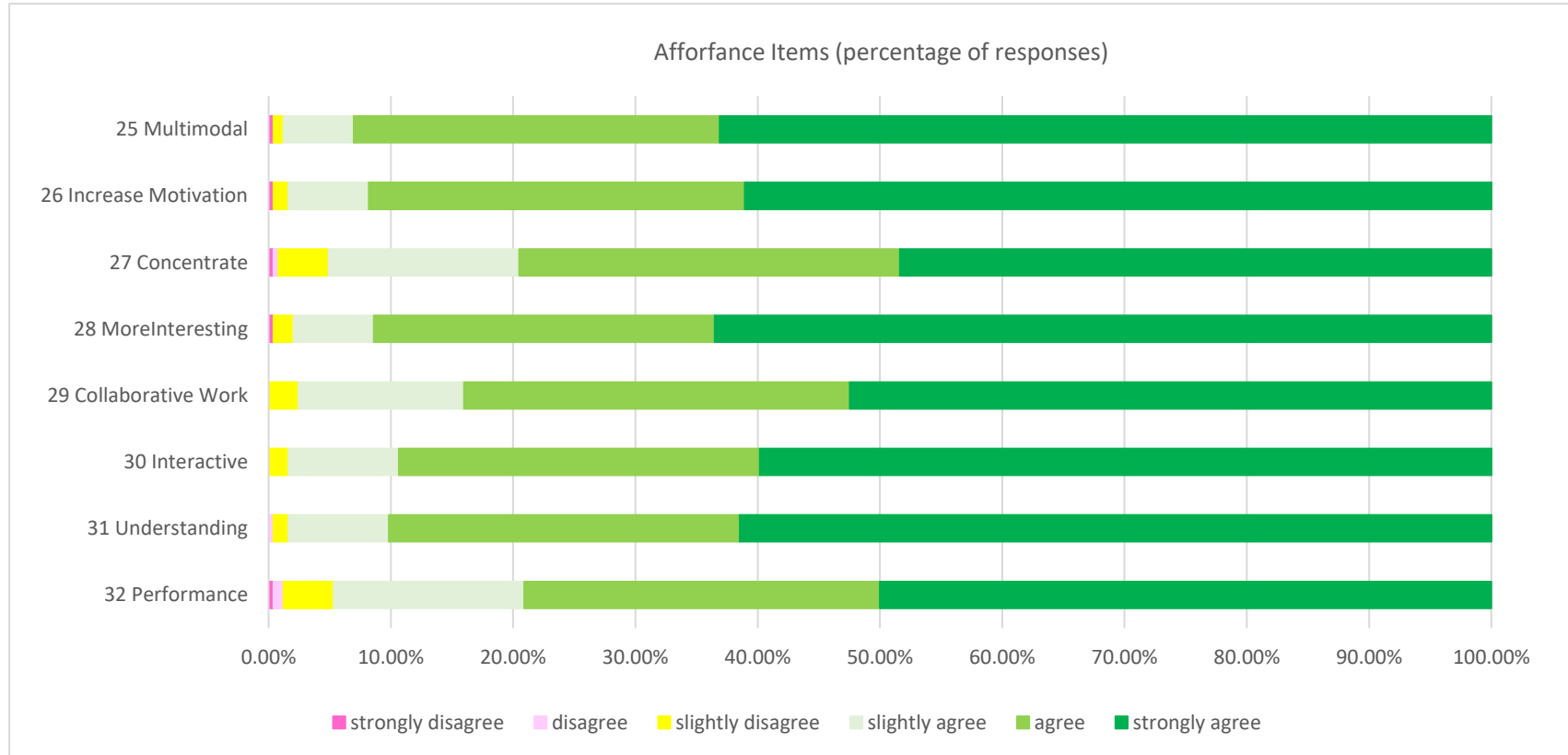
No	Items
25	Digital technology affords multimodal features to support learning.
26	Using digital technology has increased students' learning motivation.
27	Using digital technology in the class helps students concentrate while learning.
28	Using digital technology in the English class makes learning more interesting.
29	Digital technology facilitates students' collaborative work.
30	Using digital technology makes English lessons more interactive.
31	Students understand the learning content more easily with the support of digital technology.
32	Using digital technology improves students' academic performance.

Table 5.8*Descriptive Statistics of Affordance Items*

Item	Mean	SD	Min	Q1	Median	Q3	Max	IQR	Mode	Mode N
25 Multimodal	5.54	0.70	1	5	6	6	6	1	6	154
26 Increase Motivation	5.50	0.73	1	5	6	6	6	1	6	149
27 Concentrate	5.22	0.93	1	5	5	6	6	1	6	118
28 More Interesting	5.52	0.75	1	5	6	6	6	1	6	155
29 Collaborative Work	5.34	0.80	3	5	6	6	6	1	6	128
30 Interactive	5.48	0.73	3	5	6	6	6	1	6	146
31 Understanding	5.50	0.73	2	5	6	6	6	1	6	150
32 Performance	5.22	0.96	1	5	5.5	6	6	1	6	122

Figure 5.4

Single Stacked Bar Chart of Teachers' Perceived Technology Affordances (ordered by item number)



5.3.2 General Trend and Item Comparison

The descriptive statistics revealed a consistent pattern where teachers showed high levels of agreement with all the items (mean > 5.2), with low variability in their viewpoints (standard deviation < 1). Nevertheless, despite the general trend, the teachers' agreement levels varied slightly across specific items. Teachers strongly agreed that technology provides multimodal features for teaching (Item 25, mean=5.54), makes classes more interesting (Item 28, mean=5.52), and motivates students (Item 26, mean=5.50). In addition, they believed that technology facilitates students' understanding (Item 31, mean=5.50) and makes classes more interactive (Item 30, mean=5.48).

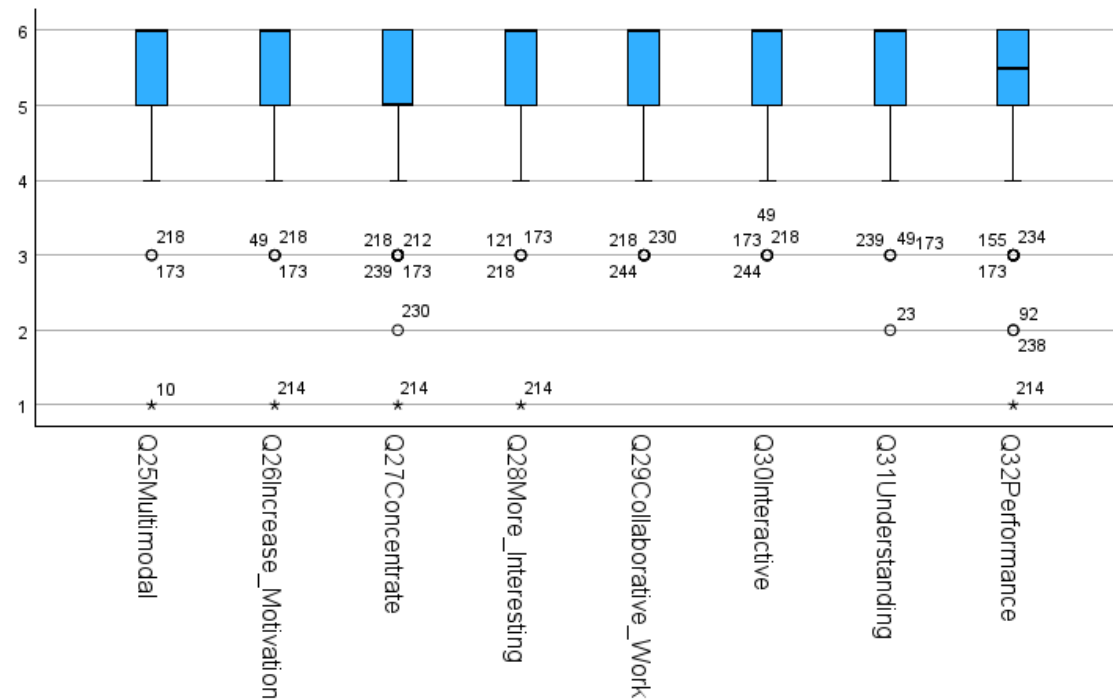
By comparison with the above findings, the results indicate that teachers perceived technology as less supportive of collaborative work compared to the affordances mentioned above, with the mean for technology supporting collaborative work (Item 29, mean=5.34) slightly lower than that of the previous items. This aligns with the findings presented in Section 5.2.2, where teachers were less likely to agree that using technology to manage student group work is easy.

Finally, teachers were less convinced about the role of technology in improving student academic performance (Item 32, mean=5.22) and enhancing concentration in class (Item 27, mean=5.22), as they agreed least with these two items in this section. This is surprising considering the high level of agreement with Item 17 in Section 5.2.2, where teachers expressed their belief in technology improving students' learning (mean=5.49, mode N=148). However, their agreement level was slightly lower when it came to technology improving students' academic performance, as reflected in their responses to Item 32 (mean=5.22, mode N=122). This suggests that while most teachers believe technology can positively impact learning, they are slightly less certain about its direct effect on students' academic performance.

Figure 5.5 illustrates the distribution of the eight items. The median of all items is above 5, which indicates that the participants highly agree with all items. In addition, while the median of the first six items is 6, the median for the perception that technology improves student performance (Item 32) is 5.5, and the median for the perception that technology helps with student concentration (Item 27) is 5. This shows that teachers' agreement levels on these two items are lower compared to the other items. Furthermore, all items have an IQR of 1, indicating low viewpoint variability among the teachers. Finally, the outliers show that several participants hold fewer positive attitudes toward these affordances. An extreme case is respondent 214, who responded "1" (strongly disagree) to many of these questions. In addition, some other respondents, such as 218 and 173, also expressed slight disagreement with many of these questions. Notably, there is a more diverse set of outliers for the last two items, which implies a lower consensus on these two affordances.

Figure 5.5

Box Plot of the Affordance Items



5.3.3 Relationship Between Technology Use Frequency and Technology Affordances

Two independent sample tests (Mann-Whitney U tests) reveal that the frequency of technology use is related to teachers' perceived affordances of technology. The results show a significant difference across all items about affordances ($p < 0.01$; see Appendix T).

The pairwise comparison result regarding frequency shows a difference between the two levels of frequency. A detailed comparison is presented in Table 5.9. The results show that teachers who often use technology agree more with all the items than teachers who use technology less often, as supported by higher medians and means. The more they use technology, the more they perceive that technology enables multimodal resources to be presented, motivates students, facilitates concentration, makes classes more interesting, supports collaborative learning, makes lessons more interactive, facilitates student understanding, and improves students' academic performance. In turn, these perceptions might encourage greater use of technology.

Table 5.9
Descriptive Measures of Two Levels of Frequency

Item	Category	Mean	Median	SD
25 Multimodal	Less often	5.00	5	0.72
	Often	5.63	6	0.66
26 Increase Motivation	Less often	4.94	5	0.75
	Often	5.60	6	0.69
27 Concentrate	Less often	4.75	5	0.94
	Often	5.30	6	0.91
28 More Interesting	Less often	5.00	5	0.76
	Often	5.61	6	0.71

Item	Category	Mean	Median	SD
29 Collaborative Work	Less often	4.89	5	0.79
	Often	5.42	6	0.78
30 Interactive	Less often	4.94	5	0.79
	Often	5.57	6	0.68
31 Understanding	Less often	4.94	5	0.79
	Often	5.57	6	0.68
32 Performance	Less often	4.67	5	1.10
	Often	5.32	6	0.91

5.3.4 Relationship Between School Type and Collaborative Work

Two independent sample tests (Mann-Whitney U tests) reveal that school type (public vs. private) influences teachers' perceptions of technology facilitating student collaborative learning. No significant disparities are found between public and private schools across any items, except for item 29, "Collaborative Work" ($p = 0.047$; see Appendix U). This suggests that public and private school teachers differ in their views on this specific affordance. The comparison of results shows that public school teachers agree more strongly than private school teachers that technology facilitates students' collaborative work, as the descriptive analysis for item 29 shows that public school teachers report a higher mean (5.39) and median (6) compared to private school teachers (mean = 5.03, median = 5).

To assess the reliability of this measure, Table 5.10 details the sample sizes. The sample is imbalanced, with far fewer private school teachers than public school teachers. Additionally, the p-value is only marginally significant, suggesting that this finding should be interpreted with caution. This result is further examined in the qualitative findings, where teachers' perceptions of this affordance are analysed alongside their perspectives on what constitutes technology-facilitated collaborative learning in public and private school contexts.

Table 5.10*Teachers Number from Two School Types*

Frequency	N
Public school	210
Private school	34

5.4 Teachers' Perceived Constraints of Technology

This section presents the constraints teachers perceive when using technology in teaching. It begins with the introduction of all items within this part of the questionnaire, followed by a comparison of the items' descriptive statistics. Finally, five key findings are reported. The first finding shows that teachers exhibit greater variation in their views regarding the perceived constraints of technology. In addition, teachers felt they need more technical support and training. Furthermore, teachers reported facing more time constraints when preparing lessons that incorporate technology compared to time constraints when using technology during lessons. Moreover, the analysis reveals a complex relationship between teachers' perceived difficulty in learning new technology and their training needs, indicating that these needs are surprisingly diverse and not limited to teachers who lack confidence. Lastly, the study reveals a significant inverse relationship between teachers' frequency of technology use and perceived constraints related to technology availability, learning difficulty, and class time.

5.4.1 Basic Data Information

To understand teachers' perception of technology (RQ 1), as well as their perceived constraints to technology use (RQ 3), this part of the questionnaire covers Items 33 through 39, which covered the key barriers affecting teachers' technology use identified in the literature review (Sections 2.4.1 and 2.4.2). Specifically, these barriers are lack of access to digital technology (Item 33), inadequate technical

troubleshooting skills (Item 34), limited technical support (Item 35), difficulty in learning new technology (Item 36), insufficient training for technology (Item 37), and time constraints related to both lesson preparation (Item 38) and teaching with technology in class (Item 39). Table 5.11 lists these items, while Table 5.12 provides the descriptive statistics. Figure 5.6 illustrates the distribution of responses across the six response options for each item in this section.

Table 5.11

Teachers' Perceived Constraint Items

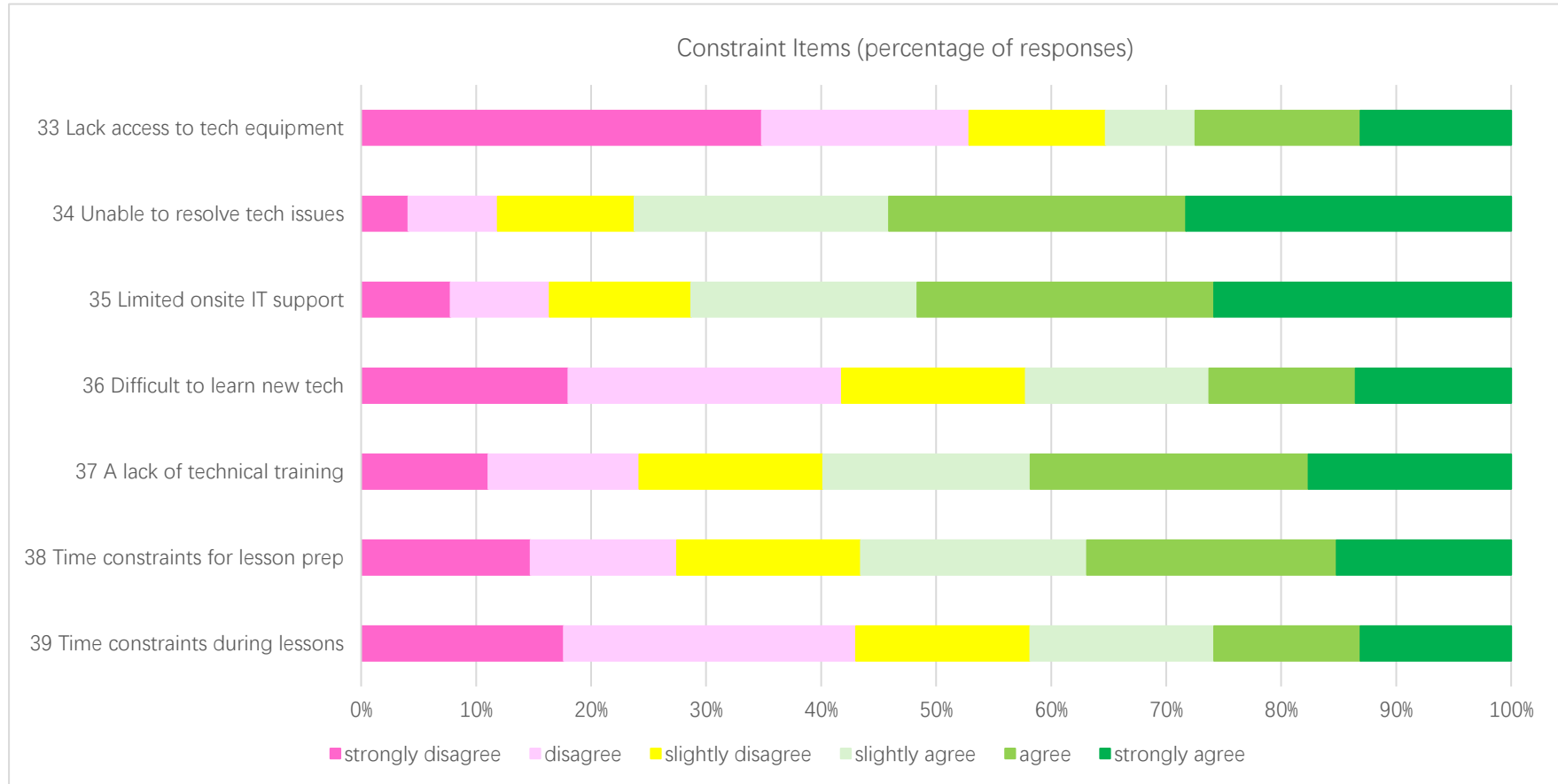
No	Item
33	There is a lack of access to digital technology in my class.
34	If something goes wrong with a digital technological tool, I will not know how to fix it.
35	When encountering technical issues in the class, there is limited technical support.
36	Learning how to use new digital technology is difficult for me.
37	Training in using digital educational technologies for teaching is lacking.
38	I usually do not have enough time to prepare lessons that integrate digital technology.
39	I do not have enough time to use digital technology to teach English in my class.

Table 5.12*Descriptive Measure for Constraint Items*

Item	Mean	SD	min	Q1	median	Q3	max	IQR	mode	mode N
33 Lack Access	2.88	1.86	1	1	2	5	6	4	1	85
34 Can't Fix	4.43	1.41	1	4	5	6	6	2	6	69
35 Limited Support	4.25	1.55	1	3	5	6	6	3	5, 6	63
36 Difficult Learn	3.22	1.68	1	2	3	5	6	3	2	58
37 Lack Training	3.84	1.62	1	3	4	5	6	2	5	59
38 No Time Prepare	3.66	1.65	1	2	4	5	6	3	5	53
39 No Class Time	3.20	1.67	1	2	3	5	6	3	2	62

Figure 5.6

Single Stacked Bar Chart of Teachers' Perceived Constraints of Using Technology (ordered by item number)



5.4.2 General Trend and Item Comparison

The descriptive statistics reveal that the participating teachers' viewpoints exhibit greater variability compared to the previous three parts of the questionnaire, where teachers showed more consistent agreement with the questionnaire items. In this section, teachers strongly agree that they do not know how to fix technical issues (Item 34, mean=4.43, standard deviation=1.41) and receive limited technical support from their school (Item 35, mean=4.25, standard deviation=1.55). Nevertheless, Item 35 has two modes (5 and 6), which indicates a broader distribution of responses and suggests more varied experiences regarding technical support, compared to Item 34 concerning technical issues, where the mode is 6.

Additionally, teachers' agreement levels regarding a lack of technical training (Item 37, mean=3.84, standard deviation=1.62) and insufficient time to prepare technology-integrated lessons (Item 38, mean=3.66, standard deviation=1.65) are lower than those for not knowing how to fix technical issues (Item 34, mean=4.43, standard deviation=1.41) and receiving limited technical support (Item 35, mean=4.25, standard deviation=1.55). This suggests that, while some teachers perceive challenges related to technical training and preparation time, their concerns are less pronounced compared to issues of troubleshooting difficulties and technical support.

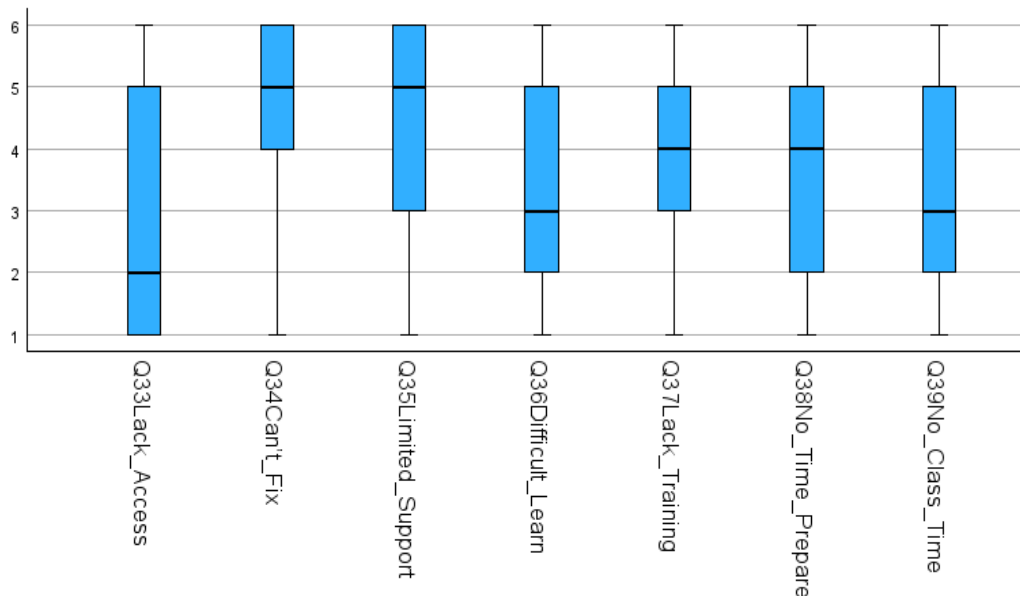
Moreover, teachers express less agreement with difficulty in learning new technology (Item 36, mean=3.22, standard deviation=1.68) and insufficient time to use technology in class (Item 39, mean=3.20, standard deviation=1.67) than the previous items. This suggests that teachers are generally more concerned with other barriers, namely technical issues, limited technical support, lack of training, and insufficient time to prepare technology-integrated lessons, than with the challenges of learning new technology and the time constraints of using technology in class.

Finally, in this section, teachers agree least that there is a lack of access to technology in the classroom (Item 33, mean=2.88, standard deviation=1.85). This suggests that, compared to other barriers, access to technology in the classroom is not perceived as a major issue. Notably, for items with greater disagreement among teachers, there is more variation in their views, as reflected by the higher standard deviation.

Figure 5.7 shows the distribution of the agreement levels regarding the items. The first two items have the highest median value (5), indicating a high level of agreement among teachers. In contrast, the last item (Item 33, Lack Access) has the lowest median line (2), showing that teachers agree with it the least. Additionally, the IQR of the items ranges from 2 to 4, and the whiskers show a range of 6 for all items, indicating considerable variation in teachers' views. Finally, the median is sometimes closer to Q1 or Q3, but at other times it is equidistant from Q1 and Q3. This indicates that in some cases, the data distribution is skewed, with responses more concentrated toward lower or higher values, while in other cases, the responses are more evenly spread across the options. The distance of the median from Q1 and Q3 indicates that the first four items are potentially negatively skewed (with most responses toward higher agreement levels), and the last three items are potentially positively skewed (with most responses toward lower agreement levels). This data distribution suggests that more teachers perceive the descriptions of the first four items (Item 34 Can't Fix, Item 35 Limited Support, Item 37 Lack Training, Item 38 No Time Prepare) as aligning with their situations, while the final three items (Item 36 Difficult Learn, Item 39 No Class Time, Item 33 Lack Access) are perceived as less relevant to their situations.

Figure 5.7

Boxplot of Technology Constraint Items



5.4.3 Teachers' Perceived Technology Constraints Showing More Variations than Previous Sections

As mentioned in Section 5.4.2, teachers' responses to perceived technology constraints show greater variability compared to previous sections of the questionnaire. While responses in other sections are more skewed, this section features responses spread more evenly across all six response options. Specifically, the answers of "slightly agree" and "slightly disagree" reveal teachers' mixed stances and nuanced views on these issues. Despite this variability, there is still a tendency towards agreement or disagreement. For convenience, in the following sections, "strongly agree," "agree," and "slightly agree" will be grouped as "agree," and similarly, "strongly disagree," "disagree," and "slightly disagree" will be grouped as "disagree." This pattern of greater variation in technology constraints is further examined in the qualitative findings, which also highlight some typical contexts in which these challenges arise and teachers' reflections on them.

5.4.4 Perceived Need for Enhanced Technical Support and Training

As with the general pattern in Section 5.4.2, the stacked bar chart (Figure 5.6) shows that 64.76% of teachers agree there is sufficient access to classroom technology. However, only 40.17% find training on using technology for teaching adequate, just 28.70% feel there is enough support for technical issues, and 23% agree that they know how to fix technical issues. This suggests that while nearly two-thirds of teachers believe they have sufficient access to technology, they perceive a need for more technical support and training. The qualitative findings provide further insights into these gaps, highlighting areas where support is needed but is perceived as lacking.

5.4.5 Greater Time Pressure for Lesson Preparation with Technology than Classroom Use

Expanding on the time-related findings from Section 5.4.2, the data reveal that teachers feel their time for preparing technology-integrated lessons is tighter than their time for using technology in class. More teachers perceive time constraints in using technology for lesson preparation (Item 38, mean=3.67, median=4, mode=5) than they do with using technology during class time (Item 39, mean=3.20, median=3, mode=2). This may be because teachers have more competing demands in their out-of-class time than in the classroom, such as reviewing students' homework and communicating with parents. This is supported by the qualitative findings, which include references to various tasks that occupy teachers' time outside the classroom.

5.4.6 The Interaction between Teachers' Perceived Difficulty in Learning New Technology and Training

Figure 5.8 illustrates the relationship between teachers' perceived difficulty in learning new technology and the amount of training they receive. The largest group consists of 97 teachers who agree with both items, accounting for 39.80% of all teachers. These teachers perceive that using new technology is challenging and that

training is insufficient.

In contrast, the number of teachers who agree with “Lack Training” while disagreeing with “Difficult Learn” is 49, accounting for 20% of all teachers. These teachers perceive that using new technology is not difficult for them, yet they desire more training. They may have confidence in their ability to learn new technology, yet they likely believe that ongoing training would help them use it more effectively, despite not finding it difficult initially.

Meanwhile, the number of teachers who disagree with both items is 91, accounting for 37.30% of all teachers. These teachers believe that learning new technology is not difficult and that their training is sufficient.

Finally, 2.86% of teachers disagree with “Lack Training” but agree with “Difficult Learn.” This suggests that for these teachers, simply providing more training may not be sufficient to address their difficulties in learning new technology. In sum, the findings reveal the varied experiences of teachers in learning new technology and differences in their training needs.

Figure 5.8

Mosaic Plot of the Interaction between Teachers’ Perceived Difficulty in Learning New Technology and Training



5.4.7 Relationship Between Technology Use Frequency and Technology Availability, New Technology Learning, as well as Class Time Constraints

Two independent sample tests (Mann-Whitney U tests) reveal that the frequency of teachers’ use of technology during lessons impacts some of their perceived technology constraints. The results show a significant difference in Items 33 (“Lack Access,” $p = 0.013$), 36 (“Difficult Learn,” $p = 0.047$), and 39 (“No Class Time,” $p = 0.003$) across technology use frequency (see Appendix V).

The pairwise comparison result shows a difference between the two levels of frequency. Descriptive analyses show that the mean and median are higher for teachers who use technology less often compared to teachers who use technology often. A detailed comparison is presented in Table 5.13. These results show that teachers who use technology less frequently tend to perceive a lack of access to technology, find it more difficult to learn to use new technology, and feel that they encounter more time constraints during lessons than teachers who use technology more often. These perceptions, in turn, may reduce their frequency of technology use.

Table 5.13

Descriptive Measures of Two Levels of Frequency

Item	Category	Mean	Median	SD
33 Lack Access	Less often	3.53	4	1.61
	Often	2.77	2	1.86
36 Difficult Learn	Less often	3.67	4	1.31
	Often	3.14	3	1.72
39 No Class Time	Less often	3.92	4	1.40
	Often	3.08	3	1.68

5.5 Teachers' Use of Technology

This section presents teachers' perceived use of technology. It begins with an introduction to all items within this part of the questionnaire, followed by a comparison of the items' descriptive statistics. Finally, two findings are reported. First, teachers use technology less for providing feedback than for other teaching tasks. In addition, a significant association was found between the frequency of teachers' use of technology and their use of technology in classroom teaching.

5.5.1 Basic Data Information

To gain a more comprehensive understanding of teachers' technology integration practices (addressing RQ 2), this section examines three distinct pedagogical contexts where technology can be applied. These include a) teachers' general use of technology for teaching (Item 21), b) their use of technology to enhance collaborative learning among students (Item 22), and c) their use of technology to provide feedback to students (Item 23). Table 5.14 lists these three items, while Table 5.15 provides the descriptive statistics for all three items. Figure 5.9 illustrates the distribution of responses across the six questionnaire options for each item.

Table 5.14*Technology Use Items*

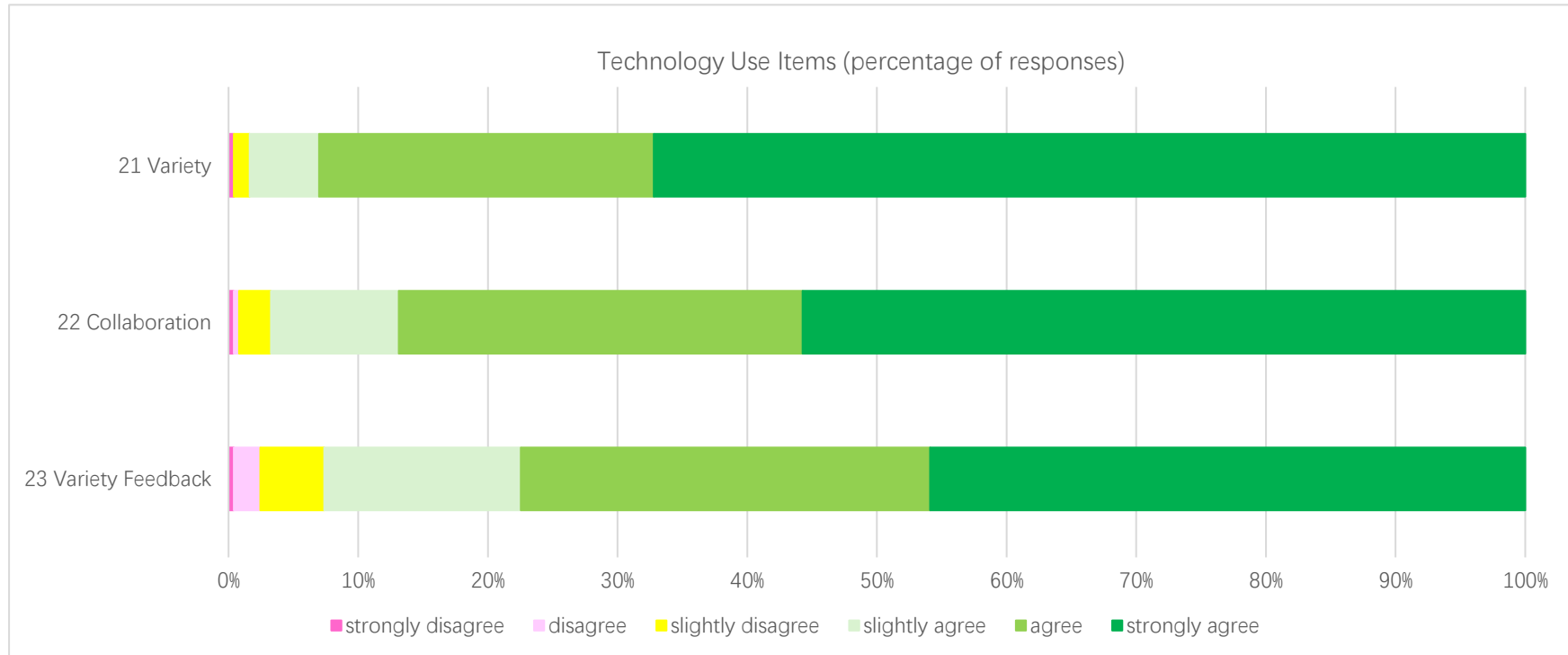
No	Item
21	I use a variety of digital technology in my teaching (e.g., interactive whiteboard, PPT).
22	I design learning activities using digital technologies to enhance collaborative learning to achieve knowledge co-creation and sharing.
23	I use a variety of digital technology to provide feedback to students.

Table 5.15*Descriptive Statistics for Technology Use Items*

Item	Mean	SD	Min	Q1	Median	Q3	Max	IQR	Mode	Mode N
21 Variety	5.58	0.71	1	5	6	6	6	1	6	164
22 Collaboration	5.38	0.85	1	5	6	6	6	1	6	136
23 Variety Feedback	5.13	1.02	1	5	5	6	6	1	6	112

Figure 5.9

Single Stacked Bar Chart of Teachers' Perceived Use of Technology (ordered by item number)



5.5.2 General Trend and Item Comparison

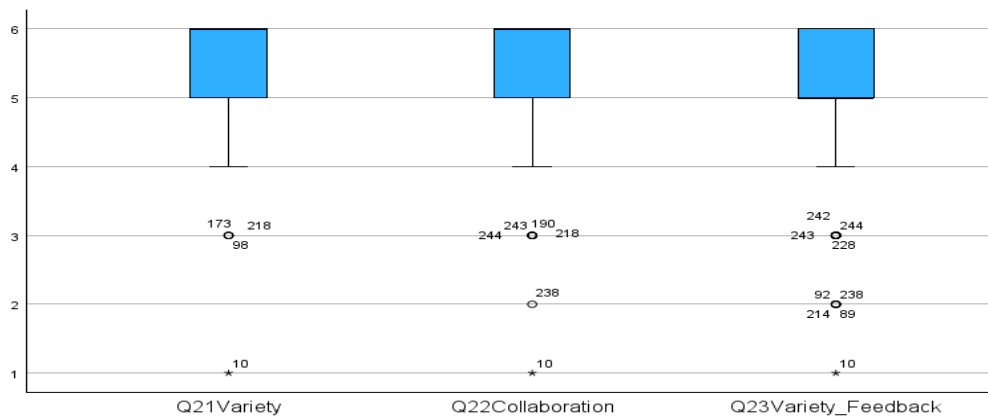
The descriptive statistics reveal a consistent pattern: teachers highly agree with all the items (mean > 5.2), with low variability in their views (IQR = 1). Despite the general trend, the teachers' agreement levels vary slightly across specific items, which provides insights into their perceptions of different aspects of technology use in teaching. They highly agree that they use a variety of technologies for teaching (Item 21). However, there is less agreement among teachers that they use technology to facilitate student collaborative work (Item 22), compared to using technology for teaching. Moreover, out of the three items, they agree least that they use various technologies to provide feedback to students (Item 23).

The responses to Item 21 can be better understood by drawing upon the data provided in Questions 7 and 8 (see Appendix A). Although teachers reported using a “variety” of technologies, the more detailed data provided by Questions 7 and 8 reveal that their choices were heavily skewed towards presentation-oriented tools, such as the IWB and PPT. This may account for the lower agreement on Items 22 and 23.

The boxplot, as shown in Figure 5.10, illustrates the distribution of teachers' agreement levels across the three items. The medians are between 5 and 6, indicating a high level of agreement. Nevertheless, teachers agree more with the first two items (median = 6) than with the last one (median = 5). Additionally, all upper whiskers are at 6, while the lower whiskers are at 4. This results in a range of 2, indicating that teachers' views fluctuate within a small range. Finally, the outliers show that respondent 10 responded “1” (strongly disagree) to all three items, suggesting their negative attitudes.

Figure 5.10

Box Plot of Technology Use Items



5.5.3 Teachers' Lower Use of Technology for Feedback than for Teaching

The results of the above item comparison show that participating teachers agree less with the statement that they use technology to provide feedback (Item 23, mean = 5.13) compared to their use of technology for teaching (Item 21, mean = 5.58). This suggests that teachers may currently perceive technology as more useful for other teaching tasks than for providing feedback. This is further supported by the qualitative findings, which provide insights into the rationale behind teachers' viewpoints.

5.5.4 Relationship Between Technology Use Frequency and Technology Use

The frequency of technology use affects how teachers incorporate technology into their teaching practices. Two independent sample tests (Mann-Whitney U tests) reveal a significant difference in all items in this section across frequency of technology use ($p < 0.01$; see Appendix W).

The pairwise comparison result regarding frequency shows a difference between the two levels of frequency. A comparison of the descriptive measures shows that the mean and median are higher for teachers who use technology often compared to teachers who use technology less often. A detailed comparison is presented in Table 5.16. The results show that teachers who use technology more frequently agree more

that they use different types of technology for teaching, for student collaborative learning, and to provide feedback. Conversely, teachers who use technology less frequently may have limited exposure to various tools and strategies. They might feel less comfortable or less confident in their ability to incorporate technology into these aspects of teaching, resulting in lower agreement levels.

Table 5.16

Descriptive Measures of Two Levels of Frequency

Item	Category	Mean	Median	SD
21 Variety	Less often	5.06	5	0.83
	Often	5.67	6	0.65
22 Collaboration	Less often	4.78	5	0.96
	Often	5.49	6	0.78
23 Variety Feedback	Less often	4.72	5	0.94
	Often	5.20	5.5	1.02

5.6 Chapter Summary

This chapter presented a detailed analysis of the questionnaire findings, addressing the study's three research questions regarding Chinese primary school EFL teachers' perceptions, use, and the factors influencing their technology usage. Overall, the findings paint a picture of teachers who are generally willing and positive towards technology but face practical barriers that hinder its varied pedagogical integration, consistent with the literature's noted discrepancy between positive perceptions and actual implementation. Frequency of use emerged as the most critical variable, consistently differentiating teachers' perceptions and practices across all areas of inquiry.

In relation to the first research question on teachers' perceptions of technology, the findings reveal a notable gap between general confidence and specific pedagogical

application. While teachers reported high levels of confidence and positive attitudes, believing technology to be useful and interesting, they felt it was more challenging to use technology for complex tasks like managing student group work or organising individual learning activities. Interestingly, teachers newer to the profession with less than 10 years of experience found it easier to manage group work with technology than their colleagues with over 20 years of experience. Importantly, this pattern was related to professional experience rather than age, as no significant relationships with age were found. Moreover, teachers who used technology more frequently held much more positive perceptions, reporting higher technology self-efficacy, greater ease of use, and stronger intentions for future use.

In addition, concerning the second research question on how teachers use technology in their practice, the findings indicate teachers reported high levels of agreement regarding their use of various technologies for general teaching tasks. In contrast, they used technology significantly less for facilitating student collaborative learning and providing feedback. As with all other areas, teachers who used technology more often reported greater and more varied use across teaching, collaboration, and feedback tasks.

Finally, addressing the third research question on factors that support or impede technology use, the analysis showed that the most significant constraints were not a lack of access to technology, but rather practical, support-related challenges. Teachers identified a lack of adequate technical support and their own limited troubleshooting skills as major barriers. Time constraints, particularly the time needed to prepare technology-mediated lessons, were also a significant concern. In terms of affordances, teachers strongly agreed that technology was effective for making lessons more interesting and motivating students through multimodal resources. However, they were less convinced of technology's direct impact on improving students' academic performance or enhancing their concentration. Once again, teachers who used

technology less frequently perceived these constraints more acutely.

In summary, this chapter provides an analysis of teachers' perceptions, affordances, constraints, and use of technology in teaching. It also highlights demographic variables, including years of teaching experience, frequency of technology use, and school type, that influence the integration of technology in classrooms. Notably, these findings stem from the use of quantitative data to identify trends, establish statistical relationships, and compare groups, advantages that qualitative data may not easily achieve. Nevertheless, while the quantitative findings reveal important patterns, they do not explain the underlying reasons. Therefore, qualitative findings will build on this foundation to provide context and deeper insights.

Chapter 6 Apple School Case Study

6.1 Introduction

This chapter presents the findings on how EFL teachers at Apple School perceive and use technology and what factors influence their technology use in teaching. It begins with background information on Apple School and the participants. It then reports on the teachers' attitudes toward the role of technology in teaching. Four pedagogical purposes are presented as themes identified from data analysis, revealing how teachers incorporate technology into their practices. These four purposes are a) fostering student engagement, b) supporting students' collaborative learning, c) enabling scaffolding to support students' learning, and d) supporting students' skill development. Next, the chapter examines teachers' perceptions of the relationship between technology and students' academic performance and English oral proficiency. Finally, it discusses the factors that influence teachers' use of technology in teaching. This chapter also incorporates the perceptions of the school principal and the head of EFL regarding how EFL teachers in their school perceive and utilise technology, along with the factors that influence technology use in class.

6.2 The Apple School Profile

Apple School is a rural, public primary school in a county of Hangzhou City. Located in one of the most remote areas from the county centre, it has a relatively lower socioeconomic status compared to other schools in Hangzhou. It has six grades (usually from age 6 to 12), around 100 teachers and 2000 students, with class sizes typically ranging from 40 to 45 students. Apple School has full wireless network coverage. All classrooms feature projectors and IWBs, which can run PPT and other software applications. At the time of data collection, the third- and sixth-grade classrooms had newly installed Seewo IWBs, which feature advanced capabilities

such as a magnifying tool, embedded digital games, and drag-and-drop functionality. Meanwhile, classrooms for other grades were still using older model IWBs.

As a public school, Apple School operates under the unified management of the district education bureau (Education Law of the People's Republic of China, 2021), which funds and provides its technology equipment. In addition, the frequency and content of training for the teachers are centrally planned and organised by the district education bureau. For example, the participating teachers reported that their district education bureau required them to take compulsory in-service professional development sessions provided by the bureau over a five-year period. In these sessions, the teachers needed to complete a minimum of 360 class hours of training, most of which was pedagogical rather than technological training. Furthermore, as a public school, Apple School follows a nationally standardised curriculum, adopts national textbooks, and conducts term-based exams. Notably, teachers reported that exams create pressure for them to teach students the content required by the national curriculum, and preparing students for exams is an important focus for them.

Apple School offers two English instruction periods (40 minutes each) weekly for Grades One and Two, and four periods (40 minutes each) for Grades Three and above. The national curriculum mandates the start of formal English classes from the third grade, using national textbooks from this grade onwards. Consequently, English classes for the third grade and higher are more formal, with students taking term-based exams. In contrast, first- and second-grade teachers use locally developed textbooks, and the classes are more informal, with no exams required.

6.3 The Participants Profile

Table 6.1 describes the profile information of the five EFL teachers, and the EFL head. Pseudonyms are used for all participants to maintain confidentiality.

Table 6.1*Profile Information of Participants*

Teacher/EFL head	Gender	Degree	Age Range	Teaching experience	Grade Level
Yun	Female	BA	20-25	< 1 year	1,2,3
Xue	Female	BA	25-30	1- 5 years	5,6
Fei	Female	BA	30-35	5-10 years	4,5
Jing	Female	BA	25-30	5-10 years	4,5
Hong	Female	BA	45-50	20-25 years	3,6
Xing (EFL head)	Female	BA	25-30	5-10 years	4

6.4 Teachers' Attitudes towards the Role of Technology in Teaching

This theme refers to the attitudes the EFL teachers expressed regarding the use and role of technology in their teaching. They reported a number of advantages and disadvantages of using technology in their teaching. Overall, they primarily viewed technology as a delivery tool and as playing a subsidiary role in their teaching. Furthermore, they emphasised that a teacher's teaching methods and lesson design were more important than the use of technology and that pedagogical knowledge held greater value than technological knowledge.

In this section, I provide a general overview of teachers' perceptions regarding technology use, which serves as a foundation for the more specific analyses that follow. Some themes introduced here, such as challenges in learning new technology, are explored in greater detail in Sections 6.5, 6.6 and 6.7.

6.4.1 Teachers' Perceptions of Technology's Advantages and Disadvantages in English Teaching

The teachers discussed what they perceived as both the advantages and disadvantages of technology in their teaching. In terms of the advantages of technology, they felt that the use of it enhanced their teaching. They thought it played a vital role in enriching

language input, creating contexts for their teaching content, drawing students' attention, sparking students' interests, and improving teaching efficiency. They imagined scenarios where they were not able to access technology, with their words revealing that they see technology as a valuable component of effective teaching in their classrooms. For example, Xue said:

During lessons, students engage in tasks that involve many characters. We need to use PPTs to present this kind of information with pictures or animations in class...Just using a textbook makes the lesson dull, and students would be left with nothing but reading over and over, right?

Xue's quotation illustrates that technology helps teachers create a context for learning and makes lessons more engaging. Similarly, Yun said, "If I just talk without pictures, students may not know what I am talking about." Yun's statement highlights that oral explanations alone may not be sufficient to meet students' learning needs. Technology can provide visual aids, facilitating students' understanding. Moreover, the EFL head noted in the interview that the teachers at their school frequently used technology to enhance lesson delivery and student engagement, and the teachers considered these to be key advantages of integrating technology into teaching. Together, these quotations and perceptions suggest that teachers view technology as a valuable tool for effective teaching in their classrooms.

While the teachers valued digital technologies, they also commented on several disadvantages associated with their use. These concerns can be broadly categorised into pedagogical constraints of technology, challenges faced by the teachers, and potential impacts on student well-being.

From a pedagogical standpoint, teachers worried that technology could sometimes be less effective than traditional tools or even become a distraction. For instance, Yun found that writing calligraphy on an electronic screen was less fluid and produced less

neat results compared to using a blackboard, prompting her to revert to the traditional method for demonstrating proper lettering. In addition, Jing believed that flashy PPT slides with many advanced elements might distract students from focusing on the learning content, so she avoided using PPTs with too many high-tech features in her teaching. As she noted, “In my teaching, I generally avoid making PPT slides too flashy... I don’t include many high-tech elements or overly complex features in my slides.”

Another set of challenges related to the teachers’ own technological skills and confidence. Hong provided a vivid example of this, recounting her struggle with creating a complicated “suitcase effect” in a PPT to enlarge an image. Frustrated by the complexity, she noted, “I don’t know how to do it. I don’t bother with it. Also, I don’t have much confidence.” This highlights how technological complexity can pose a challenge for teachers’ implementation and confidence. Interestingly, this specific barrier for Hong was later removed by the introduction of a new Seewo IWB, which featured a user-friendly magnifying tool that accomplished the same task with a single click.

Finally, a concern for students’ physical well-being was also raised. Jing, for example, pointed out a widely held concern about technology in the classroom, noting that it could “negatively affect students’ eyesight.”

6.4.2 Viewing Technology Mainly as a Delivery Tool

The teachers reported that their in-class technology integration mainly involved using PPT and IWB to present teaching content. For example, Fei described, “It’s like using a PPT or IWB to create a scenario for them [students] and transfer the content of the textbook onto the screen.” Similarly, Jing noted, “We play videos and audio clips and display vibrant and clear images, which save time compared to drawing on the blackboard and make students more interested. A single PPT slide can also present

many knowledge points.”

In these two examples, the teachers’ quotations show that PPT and IWB primarily function as delivery tools for presenting multimodal elements, such as images, videos, and audio, to support teaching.

That teachers use technology as a delivery tool to support their teaching was also evident in classroom observations. For instance, in one of Jing’s classes, she presented a few sentences, as shown in Figure 6.1. By displaying three hearts labelled with “best,” students were able to understand the meaning of “favourite” easily. This instance exemplifies technology functioning as a delivery tool because it is used as a more dynamic version of a blackboard, which is to present visual information directly from the teacher to the students.

Figure 6.1

Hearts to Show “Favourite”

I like salad. ♥
I like salad better. ♥♥♥
I like salad best. ♥♥♥♥ = My favorite food is salad.

In line with this perception of technology being a delivery tool, all five teachers viewed it as primarily playing a subsidiary role in class. They thought technology was not always necessary, and the use of it depended on the needs of lessons or students which took priority. For example, Hong stated, “Different lesson types and content require different approaches. It doesn’t mean we have to use PPT every time...My lessons’ or students’ needs are my main considerations.” Here, Hong’s statement indicates that she believes the use of technology depends on students’ needs and teaching objectives. Similarly, Jing noted, “Not everything is suitable, so we need to weigh the options and see if this digital technology is appropriate for our lessons.” Jing’s quotation suggests that she considers technology as not always necessary but

rather something that should be weighed up and decided upon based on specific teaching needs.

6.4.3 Emphasis on Pedagogical Knowledge over Technological Knowledge

In line with the above findings, the five teachers believed that lesson design and teaching methods mattered more than technology use, and teachers' professional knowledge was more important than technological knowledge. For example, Fei said, "I think whether it's an ordinary IWB or a Seewo IWB, it is just auxiliary." She continued,

Technology supporting students in discovering knowledge is just like the traditional teaching method of letting students discover knowledge. Perhaps the commonality in knowledge construction lies in the teaching methods rather than in whether it's presented by the teacher or through PPT.

Fei's statements indicate that she thinks teachers' lesson design and teaching methods are of greater importance than the use of technology. For her, the teaching method is key to student knowledge construction, not technology. Similarly, Jing stated, "I think as an English teacher, the training should be more on professional development and pedagogical training. Technology might be considered secondary in terms of professional expertise." Jing's comment underscores the centrality of teacher expertise in teaching, expressing that pedagogical knowledge holds greater value than technological knowledge.

In summary, the Apple school teachers discussed both pros and cons of using technology in teaching. They primarily viewed technology as a delivery tool that played a subsidiary role in their teaching, as its use was not indispensable but depended on lesson objectives and students' needs. Furthermore, they considered lesson design and teaching methods more important than technology use and emphasised pedagogical knowledge over technological knowledge.

6.5 Technology Engages Students

Though the five teachers mainly used technology as a delivery tool, they reported being able to draw on the affordances of technology to enhance their teaching. This section focuses on how they used technology to engage students and encourage student participation.

6.5.1 Technology Makes Class More Interesting

Teachers used two strategies to engage students in class: stimulating students' interest and encouraging students' participation. To stimulate interest, they utilised multimodal elements such as pictures, videos, and songs to “liven up the atmosphere in the classroom” and “make students excited,” since “students are interested in the audio, video, and special PPT effects” (Yun). The classroom observation data show how teachers used multimodal elements to spark students' interest. For example, in one of Xue's classes, she played a song. In the music video, a character who was walking normally suddenly flew into the sky, causing the students to exclaim, “Wow!” In another lesson, Fei, when teaching phonics, displayed a cartoon face image on a slide. The facial expression resembled the symbol /ɒ/, and the mouth shape—open and rounded—also resembled /ɒ/, as if the sound /ɒ/ could be uttered in the next moment. These stimulations were perceived by teachers to be “vivid and lively” and to make learning more fun.

In addition, teachers felt that multimodal elements enabled them to increase the diversity of learning activities, which was attractive to students. For example, Xue said, “In class, it feels more enjoyable with various activities, such as listening to music and watching videos, rather than just reading all the time.”

6.5.2 Technology Encourages Students' Participation

To encourage student participation in class, four approaches were adopted, with the

first being game-based learning. The teachers shared how they used digital games to encourage student participation. For instance, Hong said,

In one class, I played a game called whack-a-mole, where when you hit one, it could present a question, and if a student answered correctly, they succeeded...When learning numbers, I rolled the [digital] dice, and students called out, 'two,' 'three,' and so on. They liked them.

This statement illustrates how teachers used game-based learning to transform traditional learning scenarios into more dynamic and enjoyable experiences. The whack-a-mole game exemplifies a sequential one at a time participation activity while in the digital dice activity multiple students participated at the same time. In both cases, the teacher's intention in using the game-based activities was to encourage students' participation in class.

The second approach is technology interaction. In the context of Apple School, this refers to students using the interactive features of the newly installed Seewo IWBs in the third and sixth-grade classrooms to study during lessons (as detailed in Section 6.2, these grades were equipped with new Seewo IWBs). Yun found students were excited about interacting directly with the digital content, which encouraged their participation. As she said, "If they could circle or draw a few strokes on the board, they would be very excited."

Hong further extended Yun's observation to consider the wider classroom dynamics. She argued that the technology interaction not only engaged the student at the board but also those in their seats. She explained,

Like in my class today, when circling contents, you could ask a student to come to the front and demonstrate. If you don't have that option, you just explain to them, 'Look, this is a horizontal line, and this is a circle.' Some students might not pay attention to that. However, when a student comes up

and demonstrates, other students tend to pay more attention because they are around the same age and more aware of their peers' actions.

Here, Hong pointed out the traditional method, where the teacher merely pointed out key knowledge points, might fail to attract students. However, by involving a student in the demonstration, the learning activity shifted from passive observation of a teacher to an engaging peer-led interaction, as students tend to relate more to actions performed by their peers. In sum, the two teachers thought technology interaction encouraged student participation in class.

The third approach to fostering student participation involved the use of technology-supported assessments. Teachers often used PPT to present evaluation criteria in a visual format, such as stars. Hong pointed out the visual presentation was particularly useful to younger learners, as they might not fully understand abstract verbal feedback. As she said, "Third graders might not know what 'great' means. For lower grades, using little stars could be more intuitive...and students might find it more engaging." Here, Hong thought technology supported the presentation of simple and clear symbols that represented easy-to-understand evaluation criteria. She felt this easier understanding might make students more likely to participate.

Yun added another type of technology-based assessment: automatic assessment. She said, "The digital results, how many right answers there are and which group wins, are more intuitive and straightforward." She explained that when students were involved in a process where technology handled the scoring, they perceived the assessment as "fairer" and more objective. She thought the "automation," "intuitiveness," and "fairness" encouraged ongoing student participation.

The fourth approach was technology-supported Total Physical Response (TPR). TPR is an approach that involves students physically responding to language input. Each

listening-speaking lesson in the national textbook includes a “Let’s Do” activity designed to help students learn language structures through movement. By incorporating technology into this approach, all five teachers found that they could make the “Let’s do” activities more engaging. For example, in one of Yun’s lessons, a cartoon bear appeared on the slide, moving by itself and prompting students with instructions: “Touch your eyes. Close your eyes...” Yun explained that the students were always more engaged when they could see and follow the characters on the screen. She noted, “It’s like the characters are talking to them, which captivates them more than just hearing my voice.” Similarly, Fei used a video chant in her lesson: “Act like a fox, shake your body, eat an orange, and touch your nose.” As the students watched the video and listened to the chant, they mimicked the actions. Fei explained, “The students love to mimic the actions they see, and they participate with much more enthusiasm.”

In summary, the Apple School teachers used multimodal elements to spark students’ interest and diversify activity types, which in turn make learning more fun. They also employed technology to support game-based learning, student-technology interaction, technology-based assessment, and TPR. They thought these approaches effectively encouraged students’ participation in class.

6.6 Technology Supports Student Collaborative Learning

The Apple School teachers used technology to facilitate collaborative learning among students in the classroom. This section explores how they employed technology to support group work for language practice and how they utilised technology to facilitate peer assessment.

6.6.1 Technology Supports Student Group Work for Language Practice

The teachers used technology to provide resources to support student collaborative


learning. In English classes at Apple School, there were two common types of group work. The first type was what teachers referred to as “role-play,” where students, within their groups, practiced dialogues displayed on slides from the textbook or those chosen by teachers. The teachers then invited a few groups to perform the dialogue in front of the class. For example, Jing mentioned, “I can show a video. I have students mimic the speech in the video. Then, I let them perform role-playing scenarios in groups of two or four.” The teachers believed this setup allowed students to collaborate and perform at different levels of ability. Specifically, students with varying English proficiency could assist each other, which teachers felt improved their learning of the content.

The other type of group work involved activities like students conducting surveys or engaging in interactions where students could apply the content they had learnt in class. These activities were initially carried out within student groups, and then, using technology, students could share their tasks or present their results to the whole class if chosen by the teachers. Here, a survey example is discussed to illustrate this type of group work. In a class taught by Jing, she was observed using a PPT slide to introduce a target sentence structure for students to learn: A: “What’s your favourite food or drink?” B: “My favourite food or drink is _____. They’re/It’s _____.” After ensuring students had mastered it, she guided them to apply this structure to find out their group members’ favourite foods and drinks. At this time, the slide displayed a table, as shown in Figure 6.2. This template helped students gather information during the activity. Following the completion of these surveys, Jing employed a projector to present students’ findings, inviting them to present their results to the entire class. In this example, PPT was first used to introduce a key sentence structure to support learning, then to display a table template for data collection, and finally, a projector was utilised to help students share their findings. This example demonstrates how teachers used technology strategically not only for presenting information but also to facilitate an activity that required student cooperation and interaction.

Figure 6.2

“Favourite Food” Survey Template

Name			
Favourite food			
Favourite drink			



6.6.2 Technology Facilitates Peer Assessment

Apart from group work, all five teachers thought technology-supported peer assessment was a good form of collaborative learning. As mentioned in Section 6.5.2, the teachers displayed assessment criteria on a PPT slide, allowing students to evaluate their peers’ performance after speaking activities. Fei and Hong believed that using slides to display criteria on the big screen enabled the class to see and understand them. Their words suggest that using technology in this manner helps to create a shared, public frame of reference. By displaying the criteria clearly and persistently for all to see, the technology ensures the subsequent peer assessment is more consistent and transparent than if the criteria were delivered verbally.

In addition, Section 6.5.2 contained another example of how involving a student in the demonstration on the digital board captured the attention of their peers. Following this discussion, Hong added that if one student made a mistake, the other students could correct it. As she noted, “The other students can correct him when he does it wrong. However, if the teacher makes an error, the students might be afraid of the teacher, and they would not correct you [teacher].” Hong observed that by using technology to showcase a student’ s performance in this activity, other students were more willing to correct errors than they were with a teacher’s mistakes, which supported peer assessment.

Furthermore, Hong mentioned that technology could also support students in thinking independently during collaborative tasks. Hong recalled an instance when she put some practice exercises on the Seewo IWB. Initially she let students answer verbally. She recalled, “Some students point and whisper, ‘This, this, and that,’ which I find not good. So, I have students write the answers on the Seewo IWB instead.” She noted that when one student wrote their answer on the digital screen, the other students could still correct them if they made errors, but they were not interrupting them as they had before. Therefore, she thought that Seewo IWB changed the activity format and provided students with more space for independent thinking during this collaborative process.

In summary, the Apple School teachers used technology to provide resources to support student group work and peer assessment. One teacher, Hong, also mentioned that she found technology provided opportunities for students to think independently during the collaborative tasks.

6.7 Technology Enables Scaffolding to Support Learning

As mentioned in Section 2.3.3, scaffolded learning is an instructional strategy where teachers provide support to help students participate in and develop skills for a task. This section outlines five strategies where teachers used technology to enhance scaffolded learning: a) using technology to enhance clarity and emphasis for effective learning; b) using technology to support context-embedded learning; c) using technology to activate prior learning to support new learning; (d) using visual cues to scaffold students speaking to practice the target language; e) using technology to support formative assessment to enhance learning.

6.7.1 Technology Enhances Clarity and Emphasis for Effective Learning

The teachers believed that technology helped them to easily highlight key points

during lessons to draw students' attention. Several technological features were utilised to enhance the clarity of what teachers wished to emphasise. For example, Yun mentioned the affordances of circling features, stating, "If I only use the mouse, it might not be very clear. If I can circle it, they can clearly see which part I'm talking about." Similarly, Hong talked about the benefits of the magnifying glass feature. She noted, "I used a magnifying glass; for instance, when discussing this image, clicking on the image would zoom in..." Likewise, Jing highlighted the effectiveness of colour coding, saying, "Colour code the key points and make them stand out." In sum, these examples show that the teachers perceived these technological features as effective tools for making content stand out, thereby helping students immediately notice what was important or being emphasised.

In addition, teachers used technology to make the content visually clear to students. Jing emphasised that the clear visuals in lesson content helped students take better notes, which in turn supported them in retaining key information from class. As she said, "The students could quickly take notes, and their notes could be accurate and clear. Correspondingly, they would remember the key points more accurately and clearly." In addition, Fei reported that when she helped students review the key points at the end of a lesson, having structured information on a presentation effectively supported this process. As she noted, "Using the bullet points on PPT at the end of the class could help make the key points clearer and more focused to students."

Moreover, Yun talked about using this visual clarity to make her class activity requirement clearer to students, overcoming the limitations of verbal explanations for low-proficiency students. As she said, "If I explained verbally, it might not be as clear as presenting it on the PPT. With the PPT showing the text and you explaining it, students could better understand what tasks you wanted them to do." Furthermore, Hong added that it was important to illustrate not only the activity requirements but also the process for undertaking the activity, enhancing students' understanding of it. She shared, "Today, I have a survey activity in the 6th grade. You need to demonstrate

the process, showing students how it works step-by-step. This way, they could understand how to do it.” In sum, these examples show how teachers used technology to increase visual clarity and how this was perceived by teachers as an affordance of technology which enhanced the teaching and learning experience.

6.7.2 Technology Supports Context-embedded Learning

As mentioned in Section 2.3.3.4, context-embedded learning refers to using real-world contexts or authentic situations or materials to support the learning of new content in class. Apple School teachers used this approach extensively in their practices. For instance, in a class, to provide context to support students’ learning, Yun was observed displaying an image of a key word on the slide together with the name for it in English. She thought because students knew what the picture was, they could make a connection to the word.

Teachers also used technology to present authentic or real-life scenarios for classroom activities. For example, in one class, Xue used a shopping scenario image as a context, supporting students to use the vocabulary and sentence structures they had learnt in class to communicate. She explained, “Teachers need to create realistic scenarios, such as shopping or other daily activities, to help students apply knowledge points in specific real-life contexts.” This example shows how teachers used technology to support context-embedded learning experiences, enabling students to engage with vocabulary and sentence structures meaningfully rather than in isolation.

6.7.3 Technology Activates Prior Learning to Support New Learning

The teachers used technology to activate students’ prior knowledge in class, enabling them to draw on what they already knew to support the construction of new knowledge. The teachers at Apple School liked to use audio, videos, and songs to prepare students for new content. For example, Jing said, “We use songs and videos at the beginning of each lesson to warm up. The song or video isn’t purely for

entertainment. It provides a foundation that connects to the new lesson and its key points,” and “In a phonetics class, we revisit previously learnt phonetic content [in a music video] before introducing new material.” These quotations show that teachers use technology to help students review relevant prior knowledge to prepare them for new knowledge. Jing provided another example, stating, “In listening and speaking classes, students listen to audio clips to identify key sentence patterns. Then they reproduce these sentences after hearing them.” Jing thought listening to the audio allowed students to connect the information they heard with their prior knowledge and experiences, as they needed to use their existing knowledge to understand and extract the key sentence patterns. In sum, these examples demonstrate how teachers use technology to help students learn new knowledge by linking to their existing knowledge.

6.7.4 Visual Cues to Scaffold the Practice of the Target Language

A key function of technology observed in the classrooms was providing targeted scaffolding to bridge the gap between language comprehension and production. Teachers specifically used visual cues not just for understanding meaning, but as blueprints to help students construct their own sentences and dialogues. For instance, Yun would display example sentences on a PPT, which acted as a structural framework for students to base their own dialogues on during group work. Similarly, Fei used pictures, videos, and example sentences as direct prompts for output. Her rationale was that these materials provided a concrete starting point, empowering students to feel “able to express themselves better” by lowering the cognitive load of generating ideas from scratch.

Hong applied this scaffolding principle with a focus on integrating prior knowledge into new production. She used images and videos to trigger students’ memory of previously learned vocabulary, which is similar to the examples in Section 6.7.3. The crucial step, however, was the subsequent task: students were required to use these

recalled words to form new, communicative sentences. As Hong explained, the visual cues “stimulate them to search for those phrases in their memories,” which then become active resources for “them to use to communicate.” In all these cases, teachers utilised technology to provide structured support that moved students beyond passive knowledge and into the active role of language creators.

6.7.5 Technology Supports Formative Assessment to Enhance Learning

As mentioned in Sections 6.5.2 and 6.6.2, the teachers used PPT to present speaking criteria after some speaking activities to support formative peer assessment, as well as using automatic digital assessment tool to assess students. Furthermore, Hong explained how she used Seewo IWB to assess students to ascertain students’ learning needs. Hong said that before using Seewo IWB, she presented matching questions using a standalone PPT. In this setup, the questions and answer choices were displayed on the slide. When she revealed the answers, the correct matching lines automatically appeared on the slide due to the preset animation effects in PPT. In this arrangement, students may make mistakes, but she did not fully understand why they made such mistakes. However, she found with Seewo IWB, she could let students write their answers on the board, which helped her to spot unexpected errors and understand where students were having trouble. This enabled her to adapt her teaching in real time to better address students’ needs. In addition, compared to a traditional whiteboard, she said Seewo IWB allowed her to easily switch between different questions and assess a group of students quickly in succession. She thought this helped her gather a broader picture of students’ learning situations and knowledge gaps. As she said,

I might not have foreseen some errors, but students, particularly struggling or average students, may make such mistakes. Then, I could understand better why they made such mistakes. I can correct them and adjust my teaching... After one student demonstrates [on Seewo IWB], I can have another student come up to demonstrate, and maybe a few more [because Seewo IWB allows

you to easily switch between different questions] to understand the situations of students at different levels.

This example shows how the teacher used Seewo IWB to assess students' learning needs in a more efficient and flexible way, which she felt was not as easily possible without it.

In summary, the Apple School teachers used technology to enhance clarity and emphasis of content, facilitate context-embedded learning, activate prior knowledge, provide visual cues to scaffold students' speaking, and support formative assessment to enhance students' learning.

6.8 Technology Supports Students Skill Development

This section explores how teachers use technology to support students' learning development. In the context of Apple School EFL classes, the abilities that teachers cultivated included linguistic skills and metacognitive awareness in language learning.

6.8.1 Technology Supports the Development of Student Linguistic Skills

Throughout the Apple School teachers' lessons, improving students' linguistic skills was their central focus. Many previous sections of this chapter have demonstrated how teachers used technology to support them in achieving this goal, targeting specific competencies such as listening and speaking. As mentioned in Section 6.7.3, to develop students' listening skills, for instance, Jing had students listen to audio clips to identify key sentence patterns. She believed this approach helped students connect the auditory information with their prior knowledge to better understand and extract the grammatical structures. To develop students' speaking skills, for example, as mentioned in Section 6.7.4, Yun displayed example sentences on a PPT slide to assist students' dialogue practice. She believed technology could be used to provide a clear model that assisted students in using the taught language structures in their own

communicative dialogues.

6.8.2 Technology Supports Cultivating Metacognitive Awareness in Learning

Xue thought technology helped her to cultivate students' metacognitive awareness in learning. As has been discussed in Section 6.5.2, all five teachers displayed assessment criteria on a PPT slide, allowing students to evaluate their peers' performance after speaking activities. Xue thought that when students provided their evaluation to their peers, they also reflected on and evaluated their learning processes, strategies, and outcomes. As she said,

I think the peer assessment helps students understand the extent to which they have mastered a certain skill or concept. By adopting the perspective of judges and observing their classmates, they can gain insights into how their peers perform and reflect on their own learning progress.

Xue thought that by evaluating their peers' performance, which was enabled by technology, students became more aware of their own learning progress as well; they gained insights into the extent to which they had mastered the skills or knowledge points. Notably, although all five teachers utilised this assessment approach, Xue was the only teacher who commented on the benefit of technology in supporting students' metacognitive awareness development. The other teachers did not mention this benefit.

In summary, Apple School teachers used technology to support students' linguistic skill development and cultivate metacognitive awareness. While linguistic skills were enhanced through various teaching strategies discussed in this chapter, one teacher mentioned that metacognitive awareness was fostered through peer assessment, helping students reflect on their learning.

6.9 The Relationship between Technology and Students' Academic Performance and Oral English Proficiency

Data from the Apple School EFL teachers revealed varied perceptions about how technology relates to students' academic performance and oral proficiency. This section presents these perceptions in detail.

6.9.1 The Relationship between Technology and Students' Academic Performance

The teachers had mixed views on the relationship between technology and students' academic performance. Specifically, three teachers believe that technology might be irrelevant to students' academic performance, while other teachers think that the way they use technology might improve students' academic performance. Two teachers, Yun and Xue, stated that students' grades depend on the students themselves, with technology being irrelevant. Yun said, "I think it depends on the individual students because PPT is used in large classrooms; if students listen carefully, their learning can be improved. If they don't listen, their learning cannot be improved." In a similar vein, Xue said,

I think the IWB can only capture their interest, but does it affect their grades in the end? I don't think so. For those who want to learn, they can learn with a book. For those who don't want to learn, they feel happy looking at the IWB, but I don't think it has much effect.

The two teachers thought that even though they provided good digital resources for students and employed a variety of approaches to engage students, support students' collaborative learning, and scaffold students' learning as detailed in Sections 6.5, 6.6, and 6.7, it was up to individual students to improve their learning and grades, as ultimately students needed to listen carefully to improve their performance. By comparison, Fei also thought technology was irrelevant to students' academic performance, but her view was slightly different. She believed that students achieved

similar results in classes with and without technology because the results depended on the teachers' teaching methods, not on whether it was through a teacher's lecture or PPT presentation. As she noted, "In traditional classrooms without the use of technology, I think students' grades might not be much different [from those in current classrooms with the use of technology]."

In contrast, two other teachers believed that their way of using technology could improve students' academic performance. Jing stated that her classes needed to "ensure efficient knowledge transfer," "highlight key and difficult points," and "avoid fancy PPT elements that distract students' attention." Consistent with her approach of using technology for enhanced clarity and emphasis (see Section 6.7.1), she believed this approach helped students take better notes from PPT slides, which in turn improved their accuracy when answering exercises and test questions related to the presented material. Similarly, Hong believed that her lesson designs and her use of technology were intended to "improve students' English proficiency [which she defined as academic performance and oral proficiency]." For example, Hong mentioned she used PPT to present practice questions in the summary part at the end of the class. Therefore, she believed that her use of technology in her class could improve students' academic performance.

6.9.2 The Relationship between Technology and Students' Oral English

The contribution of technology to improving students' pronunciation was consistently recognised by the teachers. Both Jing and Fei stated that technology provided valuable resources for this purpose. Jing believed that students could achieve more accurate pronunciation by imitating models from videos and audio. Similarly, Fei noted that "imitating pronunciation and intonation can improve students' pronunciation accuracy." Their comments suggest a consensus that technology, by offering authentic and repeatable audio-visual models, serves as an effective tool for pronunciation practice.

However, when it came to developing students' oral fluency, the teachers' views diverged. On the one hand, some teachers felt their use of technology could support fluency. Fei argued that the "multimedia-supported scenarios and activities" she designed could help students improve their overall oral English. Hong also believed her teaching approach, which used technology, was designed to improve students' oral proficiency. On the other hand, Xue held a contrasting perspective, stating that fluency "depends on the teacher's teaching methods," and that technology was not of much help in this regard. This difference in opinion highlights that while technology's role in pronunciation was clear, its contribution to fluency was a point of debate.

In summary, Apple School teachers held mixed views on the relationship between technology and students' academic performance and oral English proficiency. Regarding academic performance, some teachers believed technology was irrelevant, as student outcomes depended on individual effort or teaching methods, while others argued that technology could enhance performance when used in specific approaches. Similarly, for oral English, while teachers generally agreed on technology's role in improving pronunciation, they had differing views on its contribution to fluency, with some believing technology could support fluency development while others emphasised that fluency primarily depended on teaching methods rather than technology.

6.10 Factors

Moving on from the previous sections, which focused on how teachers perceived and utilised technology in their teaching practices, this section shifts the focus to the factors influencing their technology use. Apple School EFL teachers' use of technology were shaped by a complex interplay of multiple factors. This section categorises these factors into individual-level, school-level, and system-level factors

and elaborates on each of these three levels in detail.

6.10.1 Teacher-level Factors

Teacher-level factors are factors related to teachers, such as individual characteristics and competencies of the teachers themselves. These factors include teachers' willingness, technological skills, technology self-efficacy, newness to the profession and recency of training, being accustomed to existing teaching approaches, and time constraints.

At the forefront of these teacher-level factors appeared to be their willingness to use technology. Four out of the five teachers expressed a willingness to integrate new tools into their teaching, provided that the tools were installed in the classroom, promoted or mandated by the school, and perceived as beneficial to teaching. However, they did not actively seek out new technologies on their own. Hong, on the other hand, was hesitant to adopt new tools due to her low technology self-efficacy and comfort with her existing teaching approaches.

Four of the five teachers (all except Jing) also expressed a willingness to enhance their technological skills to create PPTs with more advanced effects and visually appealing slides. They saw such improvements as a way to better engage their students and elevate lesson quality. In contrast, Jing took a different stance. She stated that the focus of her lessons was knowledge transmission; therefore, she saw no need for advanced PPT effects, as her current technological skills satisfied her need for using technology.

Beyond their willingness to adopt technology, the teachers' technological skills seemed to play a crucial role in shaping their technology use. On the one hand, all five teachers perceived that their current level of technological skills satisfied their needs for preparing lesson materials and presenting content, which supported their daily

teaching. On the other hand, four of these teachers felt their skills were inadequate for more advanced or innovative applications. For example, Fei and Hong said they often struggled to achieve the desired effects in their slides and needed to spend a long time doing so or seek help from the IT teacher. This perception was corroborated by the EFL head who reported that some teachers, especially “older teachers”, had limited technological skills, which might hinder their ability to effectively integrate technology into their teaching. However, this challenge was not an issue for Jing who believed that her classes did not require many high-tech elements, and her current technological skills were sufficient for her teaching needs.

Closely related to their skill levels, the teachers’ technology self-efficacy tended to exert a twofold influence on their teaching practice. On the one hand, when asked about their level of confidence in using current tools for their daily teaching activities, all teachers self-reported high confidence. On the other hand, their confidence wavered when facing new technologies. At one end, Jing reported the highest confidence level in adopting new tools because she believed that young people could quickly learn new technology. In the middle, Yun reported moderate confidence and explained that she could only determine whether she could successfully use a new tool after actually trying it in the classroom. Yet, she felt this was enough to motivate her to experiment with new tools in her teaching. In contrast, Hong revealed a lack of confidence, citing concerns about potential technical issues in class that she would not be able to resolve. While she felt that training would boost her confidence, she admitted she would still feel anxious. As a result, Hong’s lack of technology self-efficacy caused her fear and hesitation to adopt new and unfamiliar technologies.

Furthermore, Hong identified two interconnected factors that impeded her technology use: training recency and being accustomed to existing teaching approaches. As a teacher in her 40s with over 20 years of experience, she commented that “young teachers are better with [current] technology, while older teachers like me are slower

and not as skilled.” She felt that as technological advances evolved rapidly, her technological skills gradually became outdated. When she attempted to learn new tools, she found her abilities lagged behind newer teachers who had received more recent training in current technologies. This technological anxiety reinforces her tendency to default to familiar methods rather than risk adopting new tools. Moreover, she felt being accustomed to doing things in a certain way over the years led to her comfort with existing teaching approaches, which, in turn, makes her less willing to try out new technologies, as she noted: “For someone like us who has been teaching for over 20 years, we have our ways of doing things and may not be too keen on trying out new technologies.”

In addition to these personal and professional factors, teachers’ perceptions of time constraints were another factor that may influence their use of technology. However, all five teachers rarely mentioned time as a significant barrier when preparing their lessons. They reasoned that slides could be reused across different classes and that ample online resources made preparation more efficient. Although Jing did note that preparing high-quality PPTs took extra time, she emphasised that this was okay when the design benefited students.

The teachers also reported few time constraints during lessons when using technology, as they primarily relied on it to present content, which they felt improved teaching efficiency. However, Fei added another perspective, noting that the limited class time (40 minutes per session) restricted opportunities for students to interact with technology or for teachers to adopt more student-centred approaches. She suggested this constraint explained why only a few students typically engaged with technology and why student-centred methods were less common in the classroom.

6.10.2 School-level Factors

School-level factors refer to the environment and resources provided by the school,

encompassing technology availability, technical support, technological and pedagogical training, the school administration's attitude towards technology, teacher collaboration, and interpersonal influence among teachers regarding technology use.

All five teachers stated they had the necessary technology for their core teaching tasks and did not feel a shortage of essential tools. For instance, although the classrooms of three teachers were not equipped with the latest Seewo IWBs, and two of them noted other schools used iPads which they lacked, they still felt that PPT and their older-model IWBs were sufficient for tasks like displaying slides and writing annotations.

However, this general satisfaction with the availability of technology was contrasted by concerns about the condition of the equipment. Four teachers mentioned the inconvenience caused by aging hardware. For example, Jing noted that some old projection screens were so worn out that students struggled to see the content clearly, which directly impeded their learning in the classroom.

Beyond technology availability, technical support seemed to affect the teachers' use of technology. On the one hand, two teachers mentioned that the computer teacher helped them fix their malfunctioning computers after class and brought their PPT design ideas to life when they lacked the technological skills to do so themselves. On the other hand, three teachers also reported the limitations of technical support, stating that the technology teacher could only repair the equipment after class. As they were unable to troubleshoot the issues themselves, they felt that these experiences disrupted the flow of their teaching if issues occurred during class.

The teachers noted that technological and pedagogical training was supportive, but they identified significant limitations in its content and quantity. On the one hand, four of the five teachers believed they improved their technological skills through this training, learning how to better use technology to teach. Nevertheless, this positive

view was tempered by the fact that training sessions often focused on pedagogy while offering only basic technological skills.

Teachers also highlighted structural problems with how technological training was conducted, which hindered effective technology adoption. The EFL head and three teachers pointed out issues with the school's informal training method. They explained that the approach of selecting a few teachers to participate in training sessions, who were then supposed to train their colleagues, often failed. Sometimes these designated teachers did not conduct the follow-up training at all, and even when they did, their training might not be as effective as that provided by the original expert. Adding to the problem, Jing noted that if the new technology from a training session was not installed in their own classrooms, they would quickly forget how to use it due to a lack of ongoing practice. Finally, Hong stated that training for a new technology was usually a one-off event with no follow-up, resulting in teachers only ever mastering its most basic functions.

Furthermore, the school administration's attitude was another factor teachers felt could influence their technology use. Four teachers perceived their school administration as promoting teachers' use of technology in classrooms, exemplified by installing whiteboards in every classroom and continuously updating them and arranging teachers to participate in training sessions. By comparison, one teacher, Hong, held a different view, seeing the school neither actively encouraging nor discouraging technology use.

Finally, all the teachers mentioned that interactions with colleagues influenced their technology use. This influence manifested in two ways: direct collaboration and more subtle interpersonal influence. Regarding direct collaboration, all five teachers mentioned they benefited from sharing e-resources with each other. Four of the five teachers extended this to sharing teaching experiences with technology. In contrast,

Jing felt that teachers used similar technology and had comparable teaching approaches using technology, so there was little gain from sharing experiences. Supporting the value of direct collaboration, the school's principal believed that teacher collaboration was a particularly effective way for teachers with lower technological skills to improve their proficiency.

Beyond this direct collaboration, teachers also identified the power of indirect, interpersonal influence. Three teachers explained that their own choices regarding technology use could be influenced by observing a colleague's effective use of a tool or through recommendations. In contrast, the other two teachers stated their teaching decisions would not be impacted by what their colleagues were doing. Overall, these findings demonstrate the importance of peer dynamics in technology use.

6.10.3 System-level Factors

System-level factors at Apple School involve broader societal and educational influences that may affect teachers' practices with technology. Two teachers mentioned that using technology in teaching was a trend in the education field. They felt it was necessary to keep up with this trend; otherwise, they might fall behind. Additionally, three teachers mentioned that the characteristics of the English subject, such as the need for context and the presentation of multimodal elements, inspired them to use technology. Furthermore, Hong noted that activities compiled in the national textbook, such as "Let's Do," "Let's Chant," and "Storytime," needed the support of technology such as video to promote the implementation of the activities. For instance, in the "Let's Do" activity, students needed to follow a video to perform actions. This prompted her to incorporate technology into teaching.

The teachers also talked about how national educational policy influenced their teaching. Xue and Xing, the EFL head, noted that the country was actively promoting the integration of technology into teaching, which encouraged their use of technology

in teaching. The other teachers did not mention this policy, but they referred to another policy mandated by the national government called China's "Double Reduction" policy, which aims to reduce the academic burden on primary school children and restrict students' technology use beyond the classroom to protect their eyesight. All teachers knew the latter policy and reported that they stopped assigning application-based homework to students.

6.11 Chapter Summary

This chapter explored how Apple School teachers perceived and used technology, as well as the influencing factors that impacted their technology use in teaching. They generally perceived technology as a valuable tool that could benefit their teaching while also mentioning its constraints, such as the possibility of distracting students from learning if not used appropriately. More importantly, they believed that teacher instruction was fundamental, and technology served as a subsidiary tool to support their teaching.

In practice, teachers employed technology for four key pedagogical purposes: fostering student engagement, supporting collaborative learning, supporting scaffolded learning, and developing student skills, aspects that were also highlighted in the literature review (see Sections 2.3.1, 2.3.2, 2.3.3 and 2.3.4). However, as will be discussed in Chapter 10, the range of practices detailed here extend this under-explored area in the literature by providing specific examples of the ways in which teachers use technology to support student learning. For example, to foster engagement, teachers used multimodal elements to spark interest, while also encouraging active participation through methods such as digital games, direct interaction with technology, and technology-enhanced TPR activities. For collaborative learning, technology supported both group work, by providing resources for activities like "role play" and surveys, and peer assessment, by providing shared

criteria to ensure transparency and consistency. Furthermore, technology enabled a range of scaffolding techniques, including emphasising and enhancing the clarity of key points, supporting context-embedded learning, activating prior knowledge, and supporting language production as well as formative assessment. These practices, in turn, supported the development of students' linguistic skills and, in some cases, their metacognitive awareness.

Furthermore, while teachers actively used technology to support the development of students' linguistic skills, they held mixed views regarding its impact on student outcomes. In terms of students' academic performance, some teachers believed technology was irrelevant, while others argued that it could enhance performance when used in specific ways. Additionally, regarding technology's impact on students' oral English, some teachers thought it could improve fluency when integrated into specific teaching methods, while others believed fluency primarily depended on teaching methods, with technology playing a minor role.

Finally, the study identified a multi-layered interplay of factors influencing technology integration. At the teacher level, willingness, technological skills, technology self-efficacy, teachers' recency of training, and their existing teaching habits tended to play important roles. At the school level, aging equipment, inadequate technical support, and ineffective technological training models posed challenges, though peer collaboration was considered by both the teachers and the school principal as a supportive factor. System-level factors, including educational trends and national policies, also exerted influence on teachers' practices with technology. Collectively, these findings paint a nuanced picture of technology use in a rural public school in Hangzhou, where teachers' teaching approaches were shaped by a confluence of personal, institutional, and broader systemic influences, addressing the call for post-2020 empirical data (see Section 2.3.5).

Chapter 7 Blueberry School Case Study

7.1 Introduction

This chapter presents the findings on how EFL teachers at Blueberry School perceive and use technology in their teaching and what factors influence their technology use. It begins with background information on Blueberry School and the seven participants, including the five EFL teachers, the EFL head, and the school principal. Subsequently, it reports on the teachers' attitudes toward the role of technology in teaching. Four pedagogical purposes are then presented, which are the themes identified from the data analysis, revealing how teachers incorporate technology into their practices. These four purposes are a) improving engagement and motivation, b) enhancing student collaborative learning, c) supporting scaffolded learning, and d) fostering student skill development. Next, the teachers' perceptions of the relationships between technology and students' academic performance and English oral proficiency are discussed. The final section of the chapter delves into the factors teachers perceive as supporting and hindering their use of technology in EFL teaching. This chapter also incorporates the perceptions of the school principal and the head of EFL regarding how EFL teachers in their school perceive and utilise technology, along with the factors that influence technology use in class.

7.2 The Blueberry School Profile

Blueberry School is an urban public primary school located in Hangzhou City's high socioeconomic district. The school serves approximately 3000 students with a staff of around 200 teachers. Each class typically has 45 students. The school is well-resourced, featuring innovation and science facilities such as a robotics studio, a 3D printing lab, and a virtual reality science lab. All classrooms feature projectors and Seewo IWBs. Seewo IWBs can run PPT and many other software applications.

Moreover, like Apple School, it operates under the management of the district educational bureau, which provides its technology facilities and oversees much of its administrative work, such as teacher recruitment, term-based exams, curriculum development, and teacher training.

Like Apple School, Blueberry School starts with formal English lessons in Grade Three using the national textbooks, although from Grade One English lessons are offered, using the English textbook provided by the local educational bureau aligned with other schools in Hangzhou for students to have a taste of the language. In line with this, Grade One and Two students have two English lessons (35 minutes per lesson) per week, while students in Grade Three and above have four lessons (35 minutes per lesson) per week. It was also reported that in Blueberry School, for classes in Grade 3 and above, the last lesson of each week was used for exams, and the first lesson of the following week was used to review the exam papers. This means that such lessons were focused on the exam and its revision, not on introducing new teaching content.

7.3 The Participants Profile

Table 7.1 describes the profile information of the five EFL teachers and the EFL head. Pseudonyms are used for all participants to maintain confidentiality. In Blueberry School, the EFL head, Feng, was also interviewed as an EFL teacher.

Table 7.1

Profile Information of Participants

Teacher /EFL head	Gender	Degree	Age Range	Teaching Experience	Grade Level
Ann	Female	BA	20-25	< 1 year	3
Bai	Female	BA	25-30	5-10 years	4,6
Lin	Female	MA	25-30	1-5 years	2, 5
Dai	Female	BA	30-35	5-10 years	5
Chen	Female	BA	40-45	20-25 years	4

Teacher /EFL head	Gender	Degree	Age Range	Teaching Experience	Grade Level
Feng (EFL head)	Female	MA	50-55	25-30 years	3

7.4 Teachers’ Attitudes towards the Role of Technology in Teaching

This theme focuses on the attitudes that teachers expressed regarding the role of technology in teaching. While they reported both its advantages and disadvantages, they had mixed views in terms of how they see the role of technology in teaching. Nevertheless, they all believed that a teacher’s teaching methods and lesson design were more important than the use of technology and that pedagogical knowledge held greater value than technological knowledge.

7.4.1 Teachers’ Perceptions of Technology Advantages and Disadvantages in English Teaching

Like the teachers at Apple School, the Blueberry School teachers discussed both the advantages and disadvantages of using technology in teaching. They believed that technology could benefit their classes. For instance, Bai highlighted how PPT allows for the seamless “integration of multimedia elements and their arrangement in a sequential order.” She also pointed out the potential of iPads in “assessing students’ oral skills.” Technology affordances like these were valued by the teachers.

The teachers also noted that multimedia affordances, as offered by technology, are essential for English language learning and teaching. For example, both Bai and Lin considered videos and audio as “a must” and “indispensable” in the classroom, as they provide valuable visual and auditory support to meet students’ learning needs. Lin further emphasised the importance of images in creating a context for English lessons, stating that “if you want to create a context verbally, it’s almost impossible,” because she thought her students’ English proficiency was not yet good enough to comprehend or imagine the context presented in spoken English.

While the affordances of technology were highly valued, the teachers also commented on the disadvantages associated with their use. They expressed concerns about several issues, including the “impact of technology on students’ eyesight” (Dai), the “distractions caused by digital devices in the classroom” (Chen), and the risk of “students becoming overly dependent on technology” (Lin).

7.4.2 Mixed Views of Technology Use in English Teaching

Unlike teachers at Apple School, the Blueberry School teachers had mixed views on the role of technology in teaching. Three teachers, Ann, Bai, and Chen considered technology as a delivery tool. For example, as Bai said, “The most important thing is the design of my class. PPT just serves as a carrier. It is like a prop I present with.” Similarly, Chen noted, “If this tool is inaccessible, another tool could replace it, as their purposes are similar.” Here, the teacher means that all digital tools are delivery tools, so one tool can easily replace another. This perception also influenced Ann and Bai’s decision not to switch from PPT to Seewo IWB. Although Seewo IWB offered additional interactive features—such as drag-and-drop functionality and built-in tools like the brainstorm template tool and e-dictionary—they felt there was an overlapping delivery functionality between PPT and Seewo IWB, thereby making the introduction of Seewo IWB not so necessary.

However, other teachers at Blueberry School saw technology as more than a delivery tool. For example, Dai and Lin incorporated several technological features beyond delivery functionality. Lin explained that she utilised the drag-and-drop feature embedded in Seewo IWB to enable students to create content on the spot collaboratively (see Section 7.6.2). In addition, Dai and Lin believed that different teaching scenarios required different technological tools. For instance, Lin stated that she used multiple types of technology together to prepare her lessons, such as a laptop, mobile phone, the internet, voice-generator software, video-making software,

and PPT, because they each played a distinct role in her lesson design.

7.4.3 Emphasis on Pedagogical Knowledge over Technological Knowledge

All five EFL teachers expressed that technological and pedagogical knowledge was essential in English teaching. For example, Ann explained, “I need technological knowledge, such as how to control the sound effect timing and create the desired effects on my slides.” However, as a novice teacher, she also expressed a desire to acquire more pedagogical knowledge to support her teaching, as she felt she currently had insufficient pedagogical knowledge, which made it difficult for her to decide which activities would be effective in her class. Similarly, Chen commented that she needed technological knowledge but emphasised that effective teaching requires more than technological skills. As she said, “If you don’t have good control over your classroom, [you cannot teach effectively]. You need to develop your teaching abilities. It’s not just about PPT knowledge.” These statements suggest that the teachers perceived both pedagogical and technological knowledge as necessary for effective teaching.

While the teachers recognised the importance of both pedagogical and technological knowledge, like the teachers at Apple School, they believed that pedagogical knowledge held greater significance. As Ann and Bai noted, although PPT could be convenient for presentations, they could still “design lessons without it” because “PPT is just one vehicle for lesson design; it is not indispensable... and specific teaching objectives should drive its use rather than mere availability.” Here, the teachers emphasised that teaching design and planning should be prioritised and closely aligned with learning objectives to meet students’ needs. While they recognised the importance of using technology, they viewed it as not always necessary and as secondary to teaching methods and lesson design.

Nevertheless, the newer teachers with more recent training, such as Bai, Dai and Lin,

at Blueberry School demonstrated a greater sense of teacher agency in using technology to support their teaching than their counterparts who had more teaching experience but less recent training. These newer teachers believed that pedagogical knowledge and teacher agency played a crucial role in their decision-making about what technology to use and how to use it in their teaching. As Bai explained, “The PPT slides for my lesson do not exist until I create them. It’s not because PPT makes my lesson this or that; I design it this way.” Here, Bai emphasised that her pedagogical knowledge and agency supported her in designing her lesson and presenting the content using PPT slides. Similarly, Lin said,

I particularly enjoy technology interactivity because, in my understanding, the interaction and involvement of students in the learning process are crucial.

Why do I create activities such as moving letters around [on the digital board]? Because I want them to memorise words through spelling patterns. So, fundamentally, it’s about my teaching purposes.

Here, Lin’s quotation illustrates that her understanding, and knowledge of teaching and learning inform and guide her use of technology in class.

In summary, the teachers recognised both the pros and cons of using technology in teaching and valued both pedagogical and technological knowledge, though they consistently agreed that pedagogical knowledge was more important than technological knowledge. In addition, they had mixed views regarding the role of technology in teaching. Some of the teachers saw technology primarily as a delivery tool, while others viewed it as more than just a delivery tool, recognising its potential to enhance student interaction and other benefits. In particular, teachers with more recent training emphasised integrating pedagogical principles into technology-mediated teaching, believing their agency and understanding of teaching and learning played essential roles in lesson design and planning, which drove and informed their use of technology.

7.5 Technology Engages and Motivates Students

Teachers at Blueberry School believed that technology improves students' interest, participation, and motivation in class. This section reports on how teachers used technology to engage and motivate students.

7.5.1 Technology Engages Students and Encourages Students' Participation

Teachers at Blueberry School believed that technology enabled them to use a variety of approaches to engage students. Echoing this perception, the head of EFL noted that EFL teachers perceived technology as a tool to enhance students' interest in learning. As she put it, teachers felt that "classes without PPT become too dull." This section presents how the teachers used technology to engage and foster students' participation in the classroom.

7.5.1.1 Technology Engages Students. All five teachers believed that technology enables access to texts, images, sound, and videos in class, helping to capture students' attention. In Blueberry School, where each English class lasts 35 minutes, teachers found it challenging to maintain young learners' engagement throughout the session. As Lin put it, "Children's concentration level often doesn't last long. So, attracting them and keeping their focus on learning is important." To address this, teachers utilised technology to grab and sustain students' attention. For example, Bai was observed designing a spotlight effect in one class, as shown in Figure 7.1. The spotlight effect could shift from one character to another on the slide, effectively attracting students' focus on the character that the teacher was introducing.

Figure 7.1

Spotlight Effect on Family Members



In addition, the teachers utilised multimodal elements to “engage students’ senses in learning” (Ann). Lin provided an example to demonstrate how she incorporated auditory stimuli to enhance student engagement in learning. She said, “In my class this afternoon, when the sound of a sent email plays, the students immediately understand what it is. The sound effect is more effective than explaining it in a sentence.” Here, the teacher aimed to instruct students on the format of writing emails. She used a sound effect to simulate the class receiving an email. The students would recognise, “Ah, it’s an email coming.” She believed this auditory cue engaged students, preparing them for subsequent learning activities.

7.5.1.2 Technology Encourages Students’ Participation. The Blueberry School teachers, like their counterparts at Apple School, employed technology to foster student participation in class. Firstly, similar to the Apple School teachers, Blueberry School teachers also employed game-based learning to engage students. For example, when reviewing animal vocabulary in one class, Ann was observed displaying and animating several images of animal tails, footprints, and shadows on the slides without showing the complete pictures of the animals. This setup of visual presentation thus transformed the learning experience into a guessing game. After the class, Ann reflected, “The students enjoyed this guessing game. They eagerly raised their hands to participate.” This indicates that this game-based learning activity

fostered their students' participation, with their hand-raising serving as a clear behavioural indicator of their engagement.

Secondly, teachers at Blueberry School who used Seewo IWBs encouraged student-technology interaction to foster active participation, like some of their Apple School counterparts. For example, Dai designed a hands-on activity in one class to help students better understand language structures for describing locations. She recalled, "Seewo IWB displayed a [picture of a] messy room, and I asked students to come to the board to put things [digital elements] back in their places." She explained that they had just studied a text about locations during the class. By having students move the digital elements on the board, they were able to leave their seats and demonstrate their understanding of the newly learnt knowledge in the front of the class. She thought this made the lesson more engaging, transforming abstract concepts into a physical and interactive experience.

Thirdly, Blueberry School teachers used technology-supported peer assessment to enhance student participation, similar to Apple School teachers. Like the approach in Section 7.6.2, the teachers typically used PPT to display the assessment criteria after some speaking activities, allowing students to evaluate their peers' speaking performance. Ann noted, "Usually, when this happens, the students always shout loudly." Ann interpreted the students' energetic response as a clear sign of their active participation in the assessment process.

Finally, similar to the Apple School teachers, Blueberry School teachers utilised a technology-supported TPR approach to promote participation. As Blueberry School and Apple School used the same national textbook series, Blueberry teachers also employed the "Let's Do" activity. Similar to the examples in Section 6.5.2, teachers played videos demonstrating actions, and students followed the instructions and imitated the actions. The Blueberry School teachers commented that young children

are naturally physically active. They believed these learning activities engaged students kinaesthetically and increased student participation.

7.5.2 Technology Motivates Students

All five teachers used technology to motivate students in class. The following example from Lin demonstrates how she used digital games to enhance student motivation. In one class, she was observed asking students to do some rote learning and giving them a few minutes to master the spelling of some words. Then, she divided the class into two groups and randomly selected one student from each group to compete against each other in a digital game available on the Seewo IWB, which aimed to assess the spelling of those words. This game provided students with instant audio feedback. When the students clicked on the correct option, a cheerful sound effect “amazing” would play. Here, the teacher knew that learning spelling could be quite dry for students, but the basic knowledge had to be included in her teaching. With the aid of technology, she was able to use the digital game as an incentive after the rote learning, which she thought could motivate students to learn and increase their willingness to master the spelling of words. In addition, the teacher also came up with the idea of dividing students into two groups because she knew team competitions in digital games could motivate students as well. Furthermore, she thought the “amazing” sound effect could enhance students’ excitement and provide them with a sense of accomplishment.

In summary, Blueberry School teachers used technology to engage and motivate students in various ways. They employed multimodal elements to attract and engage students. Additionally, they utilised game-based learning, student-technology interaction, technology-supported peer assessment, and technology-supported TPR to foster participation. Furthermore, they utilised digital games to enhance motivation, making learning more enjoyable and rewarding.

7.6 Technology Supports Student Collaborative Learning

The teachers used digital tools and resources to support collaborative learning. This section reports on how the teachers employed technology to support student group work for language practice and how they utilised technology to facilitate peer assessment.

7.6.1 Technology Supports Student Group Work for Language Practice

Similar to Apple School, the teachers at Blueberry School utilised technology to support student collaborative learning primarily through two approaches: group work and peer assessment. The group work usually took two forms: what teachers referred to as “role play” and activities such as conducting surveys and group interaction. One of Chen’s classes provided a typical example of “role play” activities, where she used PPT to display text-based dialogues. Students communicated in English as they worked in pairs to practice the dialogue. Chen then invited a few pairs to perform the dialogue in front of the class. Chen thought that this approach gave students opportunities to practice target language structures with their group members, allowing students of different abilities to support each other. Additionally, it offered selected pairs a chance to perform for and interact with the whole class.

In addition to “role play”, the Blueberry School teachers employed activities such as conducting surveys and group interactions, enabling students to apply and expand on the content they had learnt. Selected groups could also perform in front of the class. Bai’s survey activity exemplified how teachers used technology to support such group work. The survey activity and template were in the textbook, as shown in Figure 7.2. Bai instructed students to ask their group members, “What would you like for dinner?” She then presented the survey template using PPT to help students gather and organise information to facilitate effective collaboration. After completing the survey, Bai selected a few students to share their findings with the class. To further

support this activity, Bai used a projector and the Seewo IWB to display the students' textbook pages on the screen during their presentations. This allowed the entire class to see the survey results together, check the accuracy of the reported sentences, and provide feedback where necessary. Reflecting on the activity, Bai noted that technology allowed students to use the target language structure in real-life scenarios through collaborative learning. As she said,

You need to ask your group members to know the answers, which enables you to report to the whole class. You also need to convert the sentence structure from the first person 'I would like' to the third person 'Mike would like' [in the report]. This helps students practice the sentences.

Figure 7.2

Survey Activity Template



7.6.2 Technology Facilitates Peer Assessment

Peer assessment was another approach the Blueberry School teachers reported using to support student collaborative learning. For example, in one of Ann's classes, to facilitate students working together to evaluate their peers' speaking performance, she

was observed displaying the assessment criteria on a PPT slide. Similar to the practices at the Apple School (see Section 6.5.2) and as mentioned in Section 7.5.1.2, Ann thought that by making the criteria visible and clear to everyone, she could prompt a common understanding of the standards. She also used one star to represent “not bad,” two stars to represent “good,” and three stars to represent “perfect” (Ann). Ann thought the digital stars made the requirements more intuitive, helping students to follow along and participate easily. After a group of students’ performance, she asked the other students to provide their ratings. She thought this process engaged students in evaluating and providing feedback on each other’s performance, encouraging collaboration and reflection.

Two Blueberry School teachers were also observed employing Seewo IWBs in class to support peer assessment. For example, in one class, Lin displayed a paragraph with blanks and a list of word options beside it on the digital board. She then asked one student to drag and drop the correct words into the blanks and asked, “Yes, or no?” If there were differing opinions among the students, she invited another student to try re-dragging the words and asked the class, “Who was right?” Lin explained that using the Seewo IWB to display the paragraph allowed all students to see the task easily. The Seewo IWB’s drag-and-drop functionality enabled her students to engage with the content actively. After they placed the words, she could provide immediate feedback, which encouraged students to think critically about the answers. When there were differing opinions among the students, she could invite other students to try it out, which allowed them to collectively work through the task. By asking who was right, she could encourage students to share their reasoning and make a collective decision.

In summary, teachers at Blueberry School used technology to support collaborative learning through group work and peer assessment. For group work, tools like PPT and Seewo IWBs facilitated role-playing activities, surveys, and other interactive tasks,

allowing students to practice language structures with peers and in real-life scenarios. For peer assessment, teachers used digital tools like PPT slides with clear criteria and Seewo IWBs for interactive tasks, enabling students to assess each other's work and engage in collective decision-making.

7.7 Technology Supports Scaffolded Learning

As mentioned in Section 2.3.3, scaffolded learning is an instructional approach in which teachers provide support to help students learn and develop their skills during tasks. This section reports on seven scaffolded learning approaches employed by the teachers with the aid of technology: a) customising digital materials to meet students' needs; b) visual aids to support student learning; c) context-embedded learning; d) activating prior learning to support new learning; e) a sequencing of content to support learning; f) message abundance to support learning; and g) supporting formative assessment to enhance learning.

7.7.1 Technology Enables Customised Digital Materials to Meet Students' Learning Needs

Newer teachers with more recent training in teaching with the current technology, and higher technological skills, reported that technology enabled them to customise digital materials that could better meet students' learning needs and proficiency levels. Their effort in customisation involved adapting available learning content and providing additional support to specific student groups.

One example from Ann shows how these teachers customised digital materials to meet students' learning needs and proficiency levels. In one of her classes, Ann used PPT to modify a picture storybook and present it to her students. In the interview, she shared her design thinking. She found a picture storybook relevant to her lesson content; however, the sentences were too difficult to her students. To address this, she

incorporated the pictures from the storybook into her slides while simplifying the original sentences by using the vocabulary and sentence structures from the current lesson. These adaptations allowed her students to see how the new words and sentence structures they learnt in class were applied in a new and interesting context. Also, because the difficulty levels of the teaching materials were within their ability, they could follow along and actively participate in the activity.

Similarly, as mentioned in Section 7.4.2, Lin stated that she used several types of technology to prepare her lessons, such as mobile phones, voice-generator software, and video-making software. She said, “Sometimes, if we want to provide richer materials that both meet the lessons’ needs and ensure students can understand these materials, it could be difficult to find such well-matched materials online; therefore, we can record them ourselves.” Here, the teacher’s quotation shows that technology tools enable her to create customised digital materials, which better align with her lesson objectives and meet her students’ needs.

In addition to adapting content, technology enabled the teachers to offer additional and tailored support for specific student groups. For instance, Lin said,

I created micro-lessons to help weaker students review at home...For students struggling with pronunciation and whose parents could not help, I assigned them educational application-based homework. Students could listen to and mimic the audio and complete the pronunciation exercises there.

Lin explained that by creating micro-lessons, students with lower-level language ability could consolidate knowledge outside of class at their own pace; the educational application could also provide targeted practice and feedback to these students, offering the support they needed beyond the classroom.

7.7.2 Visual Aids Supports Student Learning

Similar to Apple School teachers, the teachers at Blueberry School integrated visual aids to support student learning. They reported utilising technology to quickly and easily emphasise key points and draw students' attention through various highlighting techniques. These included circling on the board, magnifying content, and colour-coding letters. For example, when learning phonics, Ann coded the target letters in different colours. The different colours made the target letters stand out from the rest of the text, capturing students' attention. Ann believed this visual emphasis helped students better understand and practice the target letters' pronunciation, which was crucial for developing phonemic awareness.

In addition, the teachers mentioned that presenting content in a visual format made it clearer and more understandable for students. Chen, for instance, reported that when she used PPT slides to display activity instructions, the visual format allowed her to organise activities more effectively, as it provided students with clear expectations and requirements. Additionally, Chen noted that visual instructions "lasted longer than oral ones," offering ongoing support to students as they navigated the activity.

Furthermore, the teachers were also observed using sentence frames, example sentences, and a "word bank," i.e., a list of key vocabulary provided alongside the sentence frame, to support students' speaking. For example, in Bai's class, she used a slide to present a sentence frame, helping students incorporate new language into their speeches. She explained in the interview that she wanted her students to introduce their family members using newly learnt sentences and vocabulary. However, the task might require several sentences for a complete introduction. She was concerned that her students might struggle with the task. Fortunately, the sentence frame supported by technology could help her students construct sentences more easily by offering some basic structures.

7.7.3 Technology Supports Context-embedded Learning

Context-embedded learning involves integrating language and content within real-life contexts to support the learning of new content in class. Similar to the teachers at Apple School, Blueberry School teachers also utilised this approach to support their students. For instance, during one class, Ann displayed an image of a farm alongside its English name to provide context. She thought that because students knew what the picture was, they could make a connection to the new word. In addition, she thought the pictures could also remind them of related information and experiences if they had any, which helped them better understand the word.

In addition to pairing content with visual elements, the teachers also embedded real-world contexts for classroom activities to support student learning. For example, Bai was observed using technology to craft two scenarios in a class: children going to a store to buy gifts and celebrating a friend's birthday at a party, with the latter scenario shown in Figure 7.3. Bai explained in the interview that by creating these scenarios, students could practice the target sentence pattern "How many ___?" multiple times, since buying gifts and attending a party involve asking about numbers. She thought by embedding the target language in familiar, real-world contexts, students could have meaningful opportunities to practice the target language and have a deeper understanding of how it functions in everyday communication.

Figure 7.3

Celebrating A Birthday Party Scenario



7.7.4 Technology Activates Prior Learning to Support New Learning

Similar to teachers at Apple School, the Blueberry School teachers also used technology to activate students' prior knowledge, enabling them to draw on prior knowledge to support their development of new knowledge. For example, they believed that playing an interesting song relevant to the lesson content at the beginning of a class could "activate students' background knowledge" (Lin) and prepare them for the new content. In addition, they also helped students connect new learning with prior knowledge by reviewing previously learned content at the beginning of class. For example, when teaching new words, Ann was observed reviewing previously learned sentence structures. She then encouraged students to use the new words within these familiar sentence structures. She believed this approach would help students combine old and new knowledge to create new sentences.

Furthermore, some teachers encouraged students to connect real-life experiences with their learning, believing that this created a bridge between what students already know and what they are about to learn and thus facilitated meaningful learning. For example, in one class, Ann was observed displaying images of eggs, milk, and flour and asking students to imagine and discuss what foods these ingredients could be used to make. Ann encouraged students to use personal and life experiences to guess the word based on the visual cues. She believed this approach sparked students' curiosity, encouraged active thinking, and brought their everyday experiences to the learning process, making the new content more relatable, easier to understand, and easier to remember.

7.7.5 Sequencing Content to Support Learning

As mentioned in Section 2.3.3.3, sequencing of content to support learning involves organising and presenting content in a logical and progressive order, typically moving from simpler to more complex concepts. By structuring content in this way, students can build upon their understanding and knowledge step by step. Teachers reported that

they used this approach to support their students' learning. Bai's reading and writing class exemplified this approach through a structured sequence of activities, detailed in Table 7.2.

Table 7.2

Bai's Lesson Sequence

Step	Lesson Design
Step 1	Presented slides showing the rooms of several textbook characters and asked students about the items in the rooms and the possible activities that might take place there.
Step 2	Guided students in reading the text content from the textbook
Step 3	Played the audio of the text, allowing students to listen and read along.
Step 4	Let students retell the content of the text.
Step 5	Presented a messy room on the slide and asked students how they could tidy it up.
Step 6	Instructed students to draw their rooms and write a paragraph based on their drawings, using the vocabulary and sentence structures they had learned in the lesson.

These six steps were interrelated, with each step designed to support the next, creating, from the teacher's perspective, a smooth and effective learning process. Bai explained in the interview that, through the first step, by answering the teachers' questions, students could review vocabulary and sentence patterns to "reduce the difficulty level of reading the whole text." The second and third steps allowed students to comprehend the text. The fourth and fifth steps helped students reinforce their use of the key vocabulary and sentences. After students comprehended the text and reinforced their use of key vocabulary and sentences, they were prepared for the writing task, as was shown in step six. Throughout the process, Bai thought technology aided her not only in presenting learning content but also in creating a progressive sequence to support students in navigating their learning step by step.

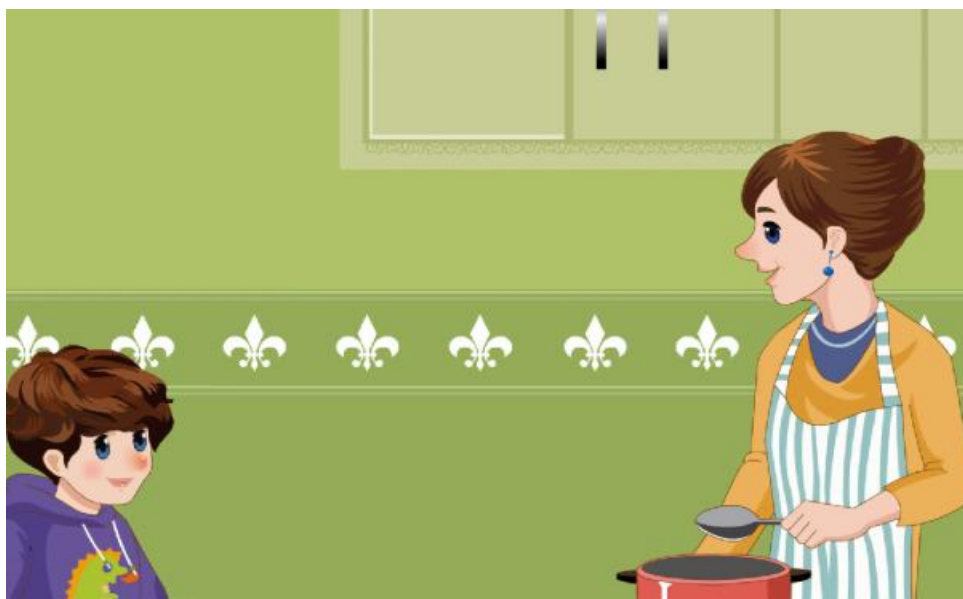
7.7.6 Message Abundancy to Support Learning

As mentioned in Section 2.3.3.5, message abundancy refers to the practice of

providing multiple forms of information and reinforcement to enhance understanding and retention. Blueberry School teachers used this approach to support students. Bai explained in her interview that she believed multiple repetitions help students master the target language points and that students need to encounter the same structure in different contexts and formats to truly understand it. This approach was clearly demonstrated during one of Bai's classes. In that class, the key sentence structure was "What would you like for dinner?" To help students master it, Bai designed her lesson so that her students could repeatedly use this sentence. Initially, she presented a picture of the character Mike on a slide (as shown in Figure 7.4) and asked students to guess what Mike would like for dinner. After playing a video to reveal the answer, she asked students about Mike's dinner again and how they knew the answer. Subsequently, Bai introduced another scenario where Mike's father joined, prompting students to guess his father's dinner, watch another video, and say the answer again. Bai felt that technology, in this process, supported the teacher's design by facilitating repeated guessing, video watching, and question answering, which required students to practice this sentence several times in different contexts.

Figure 7.4

The Image of Mike Arriving Home



7.7.7 Technology Supports Formative Assessment to Enhance Learning

Teachers used technology to conduct formative assessments, providing timely, targeted, and interactive feedback to support students' learning. For example, in a class, Chen used a projector and Seewo IWB to showcase student work samples. In the interview, she said, "This method was more intuitive, allowing students to see and discuss some common mistakes in their work." As this quote illustrates, the way teachers use the technology enables students to identify their common mistakes intuitively, supports collective discussions on those mistakes, and showcases how to correct them. In addition, she thought, through this process, she could also assess where students are at in their learning and provide timely and targeted support where needed.

Lin also used Seewo IWB to support peer assessment, which she felt allowed her to show the correcting process interactively to the whole class. This approach was similar to Hong's practice with Seewo IWB at Apple School. As discussed in Section 7.6.2, Lin used the Seewo IWB to present a segment where blanks were left with word options provided. The drag-and-drop feature of Seewo IWB allowed students to place the word options in the blanks. After one student's attempt, other students could evaluate the answer and provide alternative answers if they had different opinions. In this way, the teacher thought this process enabled peer assessment. In addition, she noted in the interview, "A great aspect of this approach was that it allowed students to generate content on the spot. Many things in real-time were unpredictable." This is to say, the content written by the students on the IWB reflected their actual grasp of the material. They might make mistakes that she could not anticipate. Therefore, she could gain a better understanding of where students were at in their learning and help them where needed.

In summary, this section highlights how teachers at Blueberry School used technology to support scaffolded learning through customising digital materials to meet student

needs, using visual aids to support learning, implementing context-embedded learning, activating prior knowledge, sequencing content, reinforcing learning through message abundance, and facilitating formative assessment.

7.8 Technology Supports Students Skill Development

This section explores how teachers in Blueberry School used technology to support the development of students' linguistic skills and learner autonomy.

7.8.1 Technology Supports the Development of Student Linguistic Skills

Like Apple School, Blueberry School teachers reported using PPT to display audio, video, and other digital resources to create a richer English language environment. For instance, they mentioned that they used PPT to display textbook audio so that students could imitate the standardised pronunciation.

For listening and speaking, teachers reported that they hoped students would not only understand the descriptive information via listening but also express themselves orally based on their understanding. For instance, in a class, Bai used an image of a living room to prompt students to describe it in English. She first guided them through listening tasks to learn new vocabulary, then had them use these words to describe the room. Bai explained that displaying visual content through technology created a structured context that could “support students in understanding new language input through listening and then applying it to speaking.” She hoped this approach would reinforce their ability to comprehend and produce language effectively.

Teachers also reported using technology to support students' reading skills. For example, in one class, Dai used PPT to display a passage from the textbook for students to read. She then asked them questions to help them understand complex sentences and identify key information for their answers. After that, she used PPT to

introduce another similar passage for students to read independently, followed by fill-in-the-blank exercises on the slides to reinforce their comprehension and mastery of the knowledge points. Dai explained in the interview that in this activity, the aim of displaying the text and interactive exercises was to improve students' reading ability by supporting word recognition, information identification, and sentence comprehension.

Furthermore, teachers reported employing technology to enhance students' writing skills. For instance, they used technology to present vocabulary in four-lined grids, aiming to help students improve the aesthetics and standardisation of their handwriting. In another example, Lin facilitated a brainstorming session where students generated ideas on the topic of weekend plans to prepare them for writing about their own weekend experiences. She organised students' ideas into mind maps using the IWB templates. She noted that this process helped students "clearly plan and structure their writing before they began".

7.8.2 Technology Supports the Development of Student Autonomy

Teachers reported utilising technology to give students greater control over their learning process. In the classroom, Lin reported that she incorporated hyperlinks in her context picture slide to enable students to navigate the content more freely. Students could indicate which items on the slide they were interested in learning, and Lin would click the corresponding link. This would take them to another slide to explore the specific items. Lin explained in the interview, "Hyperlinks enabled students to be more proactive. Before, the content in PPTs was pre-set in a sequence that I designed. Now by using hyperlinks, students had the freedom to navigate and explore." She believed this approach fostered students' autonomy, as it allowed students to lead the way, rather than being led by the teacher.

Technology also facilitated communication between parents and teachers, which the

teachers believed could support students' autonomous learning at home. The teachers usually sent the teaching materials, such as textbook audio and videos, to parents for students to review. Students' homework often included listening practice, and teachers also shared the exercise audio with parents via Ding Talk, a communication platform widely used in China for messaging, file sharing, and online collaboration. According to the teachers, this approach provided students with opportunities to review and study independently outside of the classroom at their own pace and convenience, helping to develop their autonomy.

In summary, at Blueberry School, teachers used technology like PPT and Seewo IWBs to enhance students' linguistic skills and autonomy, a practice that was not observed in Apple School. They also used technology to facilitate communication between teachers and parents and supported students in studying outside the classroom.

7.9 The Relationship between Technology and Students' Academic Performance and Oral English Proficiency

Teachers reported varied perceptions about how technology relates to students' academic performance and oral proficiency. This section elaborates these perceptions in detail.

7.9.1 The Relationship between Technology and Students' Academic Performance

The EFL teachers from Blueberry School had mixed views on the relationship between technology and students' academic performance. Four teachers (Ann, Bai, Dai, and EFL head Feng) believed that students' academic performance was determined more by teachers' teaching methods, rather than the use of technology. However, they differed in their views on technology's supporting role. Ann and Bai mentioned that if technology was used properly, it could support students' learning;

otherwise, it might “distract students from learning” (Ann). By comparison, Dai and the EFL head, Feng, noted that if the same teacher taught the same content using the same methods, then using technology, as opposed to not using it, could enhance students’ learning and academic performance.

In contrast, Chen and Lin held a different view, considering that the use of technology could improve students’ academic performance, but they did not mention how teaching methods might influence this outcome. Chen simply stated that she believed technology could improve students’ academic performance, whereas Lin viewed technology as a supplementary tool in class and highlighted its benefits outside of class. As she said, “In the classroom, teaching technology plays an auxiliary role. However, the use of some interactive or assessment software after class can help students improve their grades.”

7.9.2 The Relationship between Technology and Students’ Oral English Proficiency

Three teachers and the EFL head expressed differing views on whether technology could help students improve their oral English proficiency. The three teachers, Ann, Chen, and Dai believed that audio and video resources could assist students in enhancing their oral English. However, the EFL head, Feng, stated, “The improvement of students’ oral expression depends on the guidance of teachers,” suggesting that technology played a minimal role in this aspect. Interestingly, Dai shared a dual perspective: she stated that audio and video resources could improve students’ oral English, but she also aligned with Feng’s view on the importance of teacher guidance. As Dai explained, “If the teacher has good oral English and is skilled at providing guidance to help students express themselves, the students will also develop good oral English.”

In summary, teachers at Blueberry School held varying perceptions on the role of technology in students’ academic performance and oral English proficiency. While

some teachers believed technology could enhance academic performance when used effectively, others emphasised that teaching methods were more important, with technology serving more of a supplementary role. Regarding oral English, most teachers viewed technology as helpful, while the EFL head argued that teacher guidance was more impactful.

7.10 Factors

The previous sections discussed how Blueberry School teachers perceive and use technology in their teaching. This section shifts the focus to the factors influencing their technology use. The EFL teachers' use of technology at Blueberry School appeared to result from a complex interplay of multiple factors, which can be categorised into three levels: teacher-level, school-level, and system-level.

7.10.1 Teacher-level Factors

Teacher-level factors are those related to teachers, such as individual characteristics and perceived competencies. These include teachers' willingness, agency, technological skills, technology self-efficacy, newness to the profession and recency of training, being accustomed to existing teaching approaches, and time constraints.

Firstly, teachers' willingness to adopt new tools and improve their technological skills, along with exercising their agency, appeared to play a role in their technology integration efforts. Five teachers, all excepting the EFL head, expressed a willingness to adopt new technologies into their classrooms if they found them beneficial, had enough time to learn and master them, and saw a need for them in class. They also emphasised their readiness to improve their technological knowledge and skills to better integrate technology into teaching. For instance, Bai and Dai mentioned that many of their advanced technological skills were self-taught, demonstrating their agency. In contrast, Feng did not share the same willingness, mentioning that she felt

uncertain about her ability to master new digital tools or enhance technological skills.

Secondly, the level of technological skills that a teacher reported possessing affected their ability to utilise technology. Ann and Bai felt their PPT skills were insufficient and required further development. Chen, on the other hand, found PPT easy to use but acknowledged that she did not possess advanced technological skills and could not use IWB. Dai and Lin believed their PPT and IWB skills were up to date; however, Lin felt that her skills fell short when creating micro-lessons or PPT slides that fully aligned with her vision. In contrast, the EFL head, Feng, considered herself not proficient in using PPT.

Thirdly, teachers' technology self-efficacy tended to be a crucial influence on technology use. This confidence appeared to be highly context-dependent and varied significantly among participants. Ann and Bai reported that they lacked confidence in their technological skills. However, Bai believed lesson design was more critical for a successful lesson than advanced technology use, so she believed her pedagogical strength could compensate for her technological skill limitations. Chen's experience further illustrated the situational nature of technology self-efficacy. She expressed confidence in using basic PPT skills for regular classes but lacked confidence for "open classes," where lessons are observed by other teachers and advanced technology is typically used to impress the observers. In contrast, Dai and Lin exhibited high technology self-efficacy across multiple platforms, expressing strong confidence in their abilities to effectively utilise both PPT and Seewo IWB in their teaching practice. Meanwhile, Feng demonstrated how confidence can vary depending on specific tasks. She felt confident in her ability to deliver effective lessons using well-designed PPTs created by others but lacked confidence in creating such materials herself. These varied patterns suggest that teachers' beliefs about their technological capabilities play a pivotal role in determining the extent and manner of their technology integration in classroom practice.

Sometimes teachers' technological self-efficacy and technological skills played a joint role in decision making. For example, Ann explained, "If I had the ability but lacked confidence, or if I had confidence but lacked the ability, I would still use technology. However, if I lacked both, I would not use technology." This quote highlights that having either technological skills or confidence (or both) served as supporting factors, enabling teachers to overcome challenges and use technology in teaching. Conversely, the absence of both could create a significant barrier.

Fourthly, teachers' newness to the profession and recency of training tended to influence their teaching with technology. For instance, Ann, Dai, and Lin, who learned PPT during their university studies, demonstrated relatively better PPT skills and recognised its greater potential for application. Lin, in particular, mentioned taking courses on creating animations at university, which provided her with a foundation to create tailored materials for her teaching.

In contrast, two teachers, Chen and Bai, along with the EFL head, Feng, mentioned that their longer experience with older technology, compared to their recent training in new technology, could be a potential barrier. Chen and Feng felt that their "mindset was outdated (Chen)" and they "lagged in technological advancements" (Feng). When they were younger, they had learned the cutting-edge technologies of their time. However, as technology evolves rapidly, they felt their skills gradually became outdated. When they attempted to use new technologies, they found themselves needing to learn from scratch. This sense of starting over created reluctance and anxiety about adopting new technologies into their established teaching routines.

Fifthly, teachers reported that being accustomed to existing teaching methods posed a barrier to adopting new technology or a new teaching approach. For example, when Ann explained why she did not switch to the Seewo IWB, she said, "I feel that

transitioning from familiar teaching methods to new ones requires courage.”

Similarly, Chen stated, “Due to the influence of habit, it is difficult to change and start using new technologies.” These reflections highlight how teachers’ reliance on familiar teaching methods and technologies could be a barrier to adopting new tools or a new way of teaching with technology in the classroom.

Sixthly, teachers felt they needed time to plan how to use technology in their lessons, yet time constraints posed a significant challenge for Blueberry School teachers. Ann explained that one of the obstacles preventing her from transitioning from PPT to Seewo IWB was the lack of time during regular work hours to explore and learn the new system. Her demanding teaching schedule provided limited opportunities for technology exploration and skill development. Similarly, Chen mentioned that she lacked the time to conduct “research on new tools.” Additionally, Bai, Chen, and Dai reported encountering time constraints during lesson preparation due to the many tasks they had to handle. While Lin did not mention time constraints for regular lesson preparation, she revealed that her initiative to create micro-lessons for her class was extremely time-consuming.

In addition, in terms of time constraints in class, teachers held different views. There were instances when Ann and Bai had to skip certain classroom activities due to time limitations. Lin was selective about using digital games, mentioning that such highly stimulating activities required extra time for students to transition back to the next activity, but class time is tight. In contrast, Dai, Chen, and the EFL head, Feng, did not feel that time constraints were a barrier to classroom teaching and believed that technology improved teaching efficiency.

7.10.2 School-level Factors

School-level factors relate to the environment and resources provided by the school, encompassing technology availability, technical support, technological and

pedagogical training, the school administration's attitude toward technology use, teacher collaboration, and interpersonal influence among teachers regarding technology use.

At Blueberry School, although teachers generally expressed satisfaction with the availability of technology resources, three teachers highlighted specific needs for additional digital equipment. Ann hoped to have digital tablets for students, enabling them to create their own productions. Lin expressed a desire to experiment with interactive synchronous software in class. Bai felt that “there was nothing to assess students’ oral skills.” While student tablets were not available at her school, Bai believed that applications on students’ tablets could record their spoken English, allowing students to listen back and self-assess their performance. More importantly, she considered that these applications could automatically evaluate students’ speech, providing valuable support for both students and teachers in their assessment efforts.

Technical support also tended to influence teachers’ use of technology in teaching. Although technical support was available in schools to assist teachers, its limitations also seemed to impede teachers’ effective use of technology. Teachers reported that, at Blueberry School, the school continuously updated both hardware and software technologies, so their technical support resources were sufficient. Additionally, when technical failures occurred, the school had technical staff available to resolve them. However, it was not always possible for technical services to address all issues immediately, especially during class time, leaving teachers feeling that these technical disruptions had hindered teaching and learning. For example, Bai mentioned that the equipment in one of her classes “often malfunctions,” and “although the school frequently repaired it, the issues persisted.” She also noted that in another class, the Seewo IWB could “only play videos in MP4 format,” requiring teachers to “convert videos from other formats into MP4 during lesson preparation.”

Training, including technological training and pedagogical training, tended to be another factor that influenced teachers' use of technology in their teaching. All five teachers believed that technological training organised by the school and district educational bureau was helpful, but reported that the training sessions were insufficient, particularly during the pandemic. For example, Ann and Lin reported that they received only one introductory session of Seewo IWB. Chen and Feng reported that they did not attend the Seewo training because usually only teachers under 45 years old are invited to attend the training, excluding them due to their age. These situations suggest that teachers perceived the available technical training opportunities as insufficient. Additionally, this selective approach to training may have contributed to older teachers feeling less confident about learning new technology.

Although teachers felt the technological training was useful, the training sessions were “scheduled during their rest times” (Ann, Bai, and Dai), which made teachers feel tired. They also considered their current technological skills sufficient for daily teaching, even though some teachers stated that they encountered difficulties when preparing their PPTs. Generally, they were not enthusiastic about participating in more technological training. As Bai remarked, “It’s good to have training, but we are quite busy; a lot of training isn’t okay.”

Teachers also reported that they enjoyed participating in pedagogical training sessions organised by the district educational bureau. According to them, these training programs provided practical examples of how to design and deliver specific knowledge points using technology. Unfortunately, as these sessions often covered basic technological skills and frequently employed technology as a delivery tool, teachers felt they did not have many opportunities to learn more advanced technological skills.

The teachers reported that the school administration’s attitude toward technology use

further impacted their willingness to use technology in class. All teachers reported that their school promoted technology-mediated teaching, as evident from the constant updates and upgrades to the latest hardware and software. However, Bai and Dai also mentioned the vice principal's cautious stance on PPT use in class. According to them, the vice principal expressed concerns that "some content flashed by quickly and might not have a strong impact on students' learning." They added that the vice principal advised teachers to "give students time to really read a text" and recommended limiting the class time spent on PPT use. Bai and Dai viewed this as reflective of the school administration's attitudes and were influenced by it. Additionally, in an interview with Fu, the principal, it was found that he also regarded technology as an auxiliary tool in teaching. As he stated, "Seewo IWB has powerful features, but during lessons, teachers primarily use its basic functions, as they usually do not need the more advanced features."

Teacher collaboration on technology integration also played a role at the school. Teachers used a WeChat group (a Chinese social media platform) to share digital resources. Teachers of the same grade often collaborated on creating PPT slides for their respective grades and provided suggestions to each other in the group. Additionally, teachers engaged in an informal community of practice, learning from each other's experiences. For example, the head of EFL, Feng, mentioned that since the tech-savvy teacher Dai joined, she had sought Dai's help and had been using PPT more frequently. Furthermore, each month, two relatively new teachers at the school would deliver open classes at the school level, teaching a lesson while other teachers observed. During the preparation process and after the class observation, other teachers provided suggestions and feedback to help them design and teach lessons with technology more effectively. In the interview with Fu, the principal, he stated that although the school did not provide targeted assistance to teachers to solve technical difficulties, teacher collaboration was an effective way for them to overcome obstacles in teaching with technology.

Beyond this direct collaboration, teachers reported that they experienced more subtle interpersonal influence regarding their technology choices. Three teachers, Ann, Chen, and Dai, noted that their colleagues' use of technology could influence their technology-related choices. As Chen explained, "If everyone was using a new tool, it meant it was good, and I would consider it." Conversely, Bai and Lin stated that they would not be influenced by their colleagues' use of technology, as their primary consideration was whether the technology could benefit their class and meet their lesson needs.

7.10.3 System-level Factors

The system-level factors encompass the educational system, national policies, and prevailing trends that drive the adoption of specific technologies in teaching, such as the shift from using PPT to incorporating IWB, influenced by broader educational practices.

Three teachers highlighted the assessment-centred educational system as a significant barrier. Like Apple School, teachers at Blueberry School also faced exam pressure. Ann mentioned that exam pressure often forced her to "allocate the last five minutes of each lesson to reviewing students' homework" rather than focusing on other engaging learning activities. Similarly, Bai noted that a sixth-grade teacher at Blueberry School "focused on practice exercises in class to improve student scores." Moreover, Dai stated that "the current system hindered more innovative uses of technology" due to the examination pressure.

The teachers also discussed how national educational policy influenced their teaching. Lin noted that because of the *Education Informatization 2.0 Action Plan*, as mentioned in Section 1.2.2, teachers were required to receive technical training, and the school encouraged them to participate in micro-lesson contests, which are

competitions where teachers create and present short, technology-enhanced lessons to teach specific content. However, the other four teachers were not familiar with this policy and stated that they were either unaware of it or unaffected by it. Conversely, the “Double Reduction” policy, as mentioned in Chapter 6, which aimed at reducing academic burden on primary school children and protecting their eyesight by restricting students’ technology use beyond the classroom, had a broader impact. As a result, four teachers stopped assigning application-based homework to students. Lin, however, continued assigning it but only to students with low language proficiency who needed extra support beyond the classroom.

7.11 Chapter Summary

This chapter explored how Blueberry School teachers perceived and used technology, as well as the factors that influenced their use of technology in teaching. In doing so, it addresses the gaps identified in the literature (see Sections 2.2.4 and 2.3.5) by providing rich qualitative data on teacher perceptions, and specific examples of how, and why, teachers use technology in their classroom practice to support teaching and learning. In terms of perceptions, the teachers generally viewed technology as a valuable tool that could benefit their teaching while recognising its constraints, such as the potential to distract students from learning if not used appropriately. More importantly, they believed that teaching methods and lesson design were more important than the use of technology, and their agency and understanding of teaching and learning drove and informed their use of technology.

Next, this chapter detailed how teachers used technology and their rationales for its use. They utilised technology to engage students, support student collaborative learning, and scaffold student learning. For example, some teachers incorporated text, images, sound, and video into lessons, making learning more engaging. Some teachers also utilised the interactive features of Seewo IWB to enhance student

engagement and motivation. Some newer teachers with more recent training further demonstrated their agency and utilised various technologies to customise digital materials to cater to students' learning needs and language proficiency.

Furthermore, the teachers used technology to support the development of students' linguistic skills and learner autonomy. When exploring the relationship between technology and students' academic performance, some teachers believed that students' academic success was primarily determined by teaching methods, with technology serving only as a supportive tool. Others, however, viewed technology as an effective means to enhance learning, particularly when used appropriately. Similarly, opinions on the role of technology in developing oral English proficiency varied. While most teachers recognised the benefits of technology for language learning, the EFL head emphasised that teacher guidance played a more critical role in improving students' oral expression.

This chapter also identified a complex interplay of factors influencing technology use across three levels: teacher, school, and system. At the teacher level, teachers' willingness to learn new technologies, technological skills, technology self-efficacy, recency of training, being accustomed to existing teaching methods, and time constraints all tended to play roles in their technology use decisions. At the school level, while hardware availability was generally adequate, limitations in timely technical support, insufficient technological training, and administrators' cautious attitudes toward technology use seemed to create barriers to effective integration. However, peer collaboration and informal learning communities served as important compensatory mechanisms, enabling teachers to overcome individual skill limitations. At the system level, the examination-centred educational system tended to be a fundamental barrier, limiting teachers to employing technology more as an efficient tool than a catalyst for pedagogical transformation. These findings reveal that

successful technology integration depends not only on teachers' individual agency but is also profoundly shaped by structural constraints within the educational context.

Chapter 8 Cherry School Case Study

8.1 Introduction

This chapter presents the findings on how EFL teachers at Cherry School perceive and use technology in their teaching and what factors influence their use of technology. This chapter begins with background information on Cherry School and the participants. Subsequently, it reports on the teachers' attitudes toward the role of technology in teaching. Four pedagogical purposes, identified as themes from the data analysis and revealing how teachers incorporate technology into their practices, are then discussed. These four purposes are a) engaging and motivating students, b) supporting scaffolded learning, c) aiding student skill development, and d) supporting teachers' teaching. The final section delves into the factors teachers perceive as supporting and hindering their use of technology in teaching. This chapter also incorporates the viewpoints of the school principal and the EFL head regarding how EFL teachers at their school perceive and utilise technology, as well as the factors that influence technology use in class.

8.2 The Cherry School Profile

Cherry School is a private urban school that comprises primary, middle, and high school divisions. It has approximately 450 students and 70 full-time Chinese and foreign teachers. The average class size is small, typically between 22-24 students. The school is well-resourced, featuring mobile projectors and Seewo IWBs in every classroom, which can run PPT and many other applications. Teachers are equipped with laptops, which they can use for lesson preparation and classroom teaching. Students can use iPads in some project or reading classes. Beyond its hardware, the school also invests in digital educational resources. For example, it subscribes to a paid account on a website named Twinkl, where teachers can download high-quality

PPT templates for free. It also purchases an online library system called MyOwn, which allows students to access free high-quality English e-books on their own devices.

Although Cherry School operates under the management of the district education bureau, it maintains substantial independence as a private school. Unlike Apple School and Blueberry School, it has more freedom in many areas, including the introduction of educational technology, training, curriculum development, and student assessment standards. Using school funding, the school administrators decide on educational technology equipment purchases. In addition, the school organises most of the training sessions and invites experts to conduct them on campus. The experts are usually invited to introduce their research in the education field to the teachers. Moreover, it employs dual educational systems, combining both national and international curricula. The primary school division follows the national curriculum and the International Baccalaureate Primary Years Program. Based on these curricula, formal English classes start in Grade One using a British textbook, and from Grade Three, students incorporate the national textbook into their studies. Students have five English classes (40 minutes per lesson) per week. Therefore, much more time is allocated to learning English in Cherry School than in Apple and Blueberry Schools. Finally, student assessment is multidimensional, incorporating aspects beyond textbook knowledge and using methods that include not only exams but also various activities and competitions, such as running races, reading activities, and robotics competitions.

At the time the study was conducted, a Chinese teacher and a foreign teacher jointly shared teaching responsibilities for every English class. They collaborated to develop two teaching models. One was an alternative teaching mode. In each unit, the foreign teacher was responsible for teaching oral communication, reading, and project

lessons, while a Chinese EFL teacher assisted during these lessons. For other parts of the unit, such as the grammar and writing parts, the Chinese EFL teacher took full responsibility for teaching. The second method involved a differentiated teaching style. Given the small class size, the teachers felt they could provide more individual attention by dividing them into two smaller groups within the same class. Students, thus, were divided into two groups based on their learning progress and needs: “Fast track” and “Slow track.” A foreign teacher taught the “Fast track,” while a Chinese EFL teacher taught the “Slow track,” utilising Mandarin when necessary to aid students who were considered to have weaker English comprehension. After discussion between the Chinese and foreign teachers, they chose one of these two teaching models for their classes. This study only observed and interviewed the Chinese EFL teachers.

8.3 The Participants Profile

Table 8.1 describes the profile information of the five EFL teachers and the EFL head. Pseudonyms are used for all participants to maintain confidentiality.

Table 8.1

Profile Information of Participants

Teacher/EFL head	Gender	Degree	Age Range	Teaching experience	Grade Level
Gong	Female	BA	25-30	5-10 years	4
Han	Female	BA	25-30	1-5 years	2
Jin	Female	BA	25-30	1-5 years	3
Ke	Male	BA	25-30	1-5 years	5
Ning	Male	BA	25-30	1-5 years	4
Mei (EFL head)	Female	BA	30-35	5-10	3

8.4 Teachers' Attitudes towards the Role of Technology in Teaching

This theme focuses on the attitudes teachers expressed toward the role of technology in their teaching. While they recognised both the advantages and disadvantages of using technology, they viewed it as a necessary component of teaching. Moreover, they considered technological knowledge to be just as important as pedagogical knowledge.

8.4.1 Teachers' Perceptions of Technology's Advantages and Disadvantages in English Teaching

Like the teachers at Apple and Blueberry School, the teachers at Cherry School recognised both the advantages and disadvantages of using technology in teaching. All five teachers commented on the affordances of technology in English teaching. For instance, Han noted that technology allows teachers to “access a lot of things online” and use them in the classroom to “make the lessons a bit more fun.” Similarly, Ke highlighted that technology could “grab students' attention” and “improve students' oral performance.”

Conversely, teachers also discussed the potential disadvantages associated with using technology in teaching. They raised concerns about the potential distraction of mobile technology from learning and the possibility that technology may reduce student interaction and communication in group work, as “when there is technology involved, most students tend to focus on it” (Gong).

Furthermore, although the teachers believed that, in broad terms, using technology was necessary and recognised many of its affordances, they still felt that in specific cases, it was better to use other approaches where the advantages outweighed the benefits brought by technology. For example, Han stated, “Not necessarily that all lessons have to be fun. Some lessons require just pen and paper...” Similarly, Gong

remarked, “In Grade One and Two, it’s better not to use technology. They can use flashcards, get the kids out of their chairs, and get them talking more.” These quotations suggest that the teachers identified the limitations of technology as well as emphasised the importance of adapting teaching methods to meet the specific needs of the lesson and students.

8.4.2 Technology Use is Considered Necessary in Teaching

The teachers expressed a positive attitude toward using technology in their teaching. For example, four teachers openly stated their fondness for technology, such as, “I really like it. It makes my job easy” (Han), “I absolutely love it” (Ke), and “I like technology since I was young” (Ning).

In addition to their positive attitudes towards technology, the teachers considered its role to be necessary in their teaching, which is different from the perceptions of Apple School and Blueberry School teachers. For example, Gong and Ning thought that in the digital era, teaching with technology was essential and that “[relying solely on] books is an old way to study” (Ning). Similarly, Ke stated, “I think it is needed,” although he did not elaborate on his reasoning. Additionally, Han and Jin viewed the affordances of technology, such as enhancing interactivity in class, accessing online resources, and reducing time spent on writing, as indispensable for their teaching.

8.4.3 Technological Knowledge as No Less Important than Pedagogical Knowledge

All five EFL teachers emphasised that both technological and pedagogical knowledge were important for English teaching. For instance, Jin noted,

Technological knowledge is important... because I need it to cope with technology. Pedagogical knowledge is also necessary because I need to know what the learning objective is for students, which teaching method is effective, and how to integrate that objective and method into a game or technology.

Jin’s words illustrate that technological and pedagogical knowledge are essential in

her teaching.

As a contrast to the teachers at Apple and Blueberry School, the teachers at Cherry School believed that technological knowledge was no less important than pedagogical knowledge. For instance, Ke stated, “I think technological knowledge is not less important than pedagogical knowledge. Without technology, many teaching activities in my classroom would not be able to proceed. Technology is a very important part of my class.” Similarly, Jin noted, “I like adding interactive elements to my PPT slides to make the class engaging and interactive. Maybe technological knowledge and pedagogical knowledge are equally important.” Here, Ke viewed technology as a central part of his teaching approach, while Jin believed that technology played a crucial role in fostering student participation and enhancing interaction. And both teachers expressed that technological knowledge was just as important as pedagogical knowledge.

In summary, teachers at Cherry School recognised both the advantages and disadvantages of using technology in teaching, viewing it as a necessary component of modern education. They recognised technology’s affordances to enhance engagement, access resources, and improve oral performance, but also noted potential distractions and reduced student interaction. Despite these limitations, they considered technology essential in the digital era and believed technological knowledge was equally as important as pedagogical knowledge for effective teaching.

8.5 Technology Engages and Motivates Students

The teachers believed that technology helped them increase students’ interest, participation, and motivation in learning during class. This section reports on how teachers used technology to engage and motivate students.

8.5.1 Technology Engages Students

Cherry School teachers echoed Blueberry School teachers' perception that technology could help them attract and maintain students' attention, thereby enhancing students' engagement. For instance, Jin said, "I know when I have a PPT game or an interesting PPT with many elements that move or disappear, the students will listen, look at the screen, and pay attention." Similarly, Ke noted, "I use PPTs a lot because I feel like it helps the kids focus much more." Jin's statement suggests that PPT games and interactive elements on the slides capture students' initial interest, encouraging them to listen and watch the screen. Ke further emphasised that using PPTs helps students sustain their focus over a longer period during class. Both teachers acknowledged technology's role in keeping students attentive and engaged.

In addition to attracting and sustaining students' attention, the teachers believed that technology also helped make the learning process more fun and engaging, like their counterparts in Apple and Blueberry Schools. For example, Han said, "With technology, we are able to include interactive activities so that the kids do not get bored in class." Similarly, Jin explained, "In game-based learning, if I make students practice something many times, but they think it's a digital game, they don't feel like, 'Oh, it's studying. I don't like it.' They end up practicing without even realising it." Han's and Jin's statements suggest that they use technology-based interactive activities and digital games to make learning more enjoyable and engaging for their students.

Furthermore, the teachers used technology to engage students in discussions and deeper learning. For instance, Gong mentioned that sometimes during class, she had students come to the front of the classroom and use her laptop to look up words in an online dictionary. She said, "The laptop is connected to the Seewo IWB, and everyone wants to see what the student is searching for. Then, when the picture pops up, we talk about it." Similarly, Han mentioned that when students watched videos they were

interested in, “they always have opinions” and “say something about what they see, even with their peers.” In a similar vein, Ke explained that instead of using images he had prepared in advance for PPT slides, he browsed the internet during lessons to select pictures based on students’ preferences. He said, “It piques their interest much more than just showing them four or five pictures you decide on... they see much more. The discussion goes much deeper.” In these three examples, although the teachers used technology in different ways, their use of it captured students’ attention, creating a shared space where students could engage in communication and discussion. In addition, the teachers believed that students’ immediate responses to the content facilitated their active interaction with the material. As seen in Gong and Ke’s examples, when students searched for content, the outcomes generated by technology were more open-ended and potentially unexpected, which could stimulate students’ thinking. As a result, the teachers believed that technology facilitated students’ discussions and deeper learning.

8.5.2 Technology Motivates Students

In Cherry School, the teachers used technology to motivate students both inside and outside the classroom. In terms of inside the classroom, Jin stated that she used various sensory experiences facilitated by technology to motivate her students in class. She said,

This approach motivated students because students were looking at different things. A song is something they listen to. A video is something they see. A PPT game is something they do. These activities facilitate them to use various senses, including visual, auditory, and tactile perception.

Here, Jin highlighted that various multimedia elements could cater to different senses, making the learning experience more captivating and dynamic, thus motivating students to keep learning during lessons.

In addition, Ke shared how he used technology to help students see their progress and experience a sense of accomplishment, which in turn motivated them in class. For example, he used transitional slides or specific animation effects in PPT presentations to mark students' progression and completion during lessons. He said, "When the transition slides or specific animation effects show up, the kids feel like, 'Okay, this is done. Put it in the back of my head and save this information. There is new information coming.'" Ke reflected that he felt this approach "did motivate students" because this sense of progression made them feel "accomplished" and they looked forward to new information.

Furthermore, the teachers thought technology helped them to motivate students to participate in learning during lessons. For instance, Jin said, "I feel that technology is what this generation really likes. It is what activates them and makes everyone want to take part." Similarly, Han said, "Usually if we taught the low-level students something a little bit boring to them, they are easy to say, 'No, I do not understand.' But when it is really exciting, even the low-level students want to try." Ning added, "If they find it interesting, they want to take part. When they take part, they could learn better." From the three teachers' quotes, it can be seen that they feel using technology to motivate students to take part is a good way to support effective learning.

Finally, in terms of outside the classroom, Ke thought technology has the potential to motivate students to study at home. He recalled,

One class, I did a PPT with numbers where it was a slot machine...It was so much fun that they, without me asking, would study after class because the next time the game was being played, they wanted to be ready for it.

Here, Ke noted that technology's motivating effect on students would also extend outside the classroom because students wanted to prepare for the upcoming fun

activity.

In summary, teachers at Cherry School used technology to engage and motivate students by making lessons more interactive, fun, and sensory-rich. They employed tools like PPT games, videos, and online searches to capture students' attention, stimulate discussions, and facilitate deeper learning. They also used technology to motivate students by making lessons fun while providing a sense of accomplishment, thereby encouraging participation both in and outside the classroom.

8.6 Technology Supports Student Collaborative Learning

The teachers used digital tools and resources to facilitate collaborative learning among students within the classroom setting. This section reports on how the teachers employed technology to support student group work for language practice and how they utilised technology to facilitate peer assessment.

8.6.1 Technology Creates Shared Spaces for Group Projects

Teachers used technology as a shared platform to enhance students' collaborative learning, particularly in research-based tasks. Gong shared an example that demonstrated how iPads created a shared space to support students' collaborative learning. She said that in the project class, every group shared an iPad to search for information, do research, or do a project. Gong thought that iPad provided a shared platform where students could "work together towards a common goal"; they "held each other accountable," which minimised its distractions. This setup was reported to promote students' teamwork, develop skills in mutual accountability, and focus on shared objectives.

However, teachers reflected that group work in regular classes did not make much use of technology, except for prompts on the screen. Han explained that "with group

work, usually it just asks the kids to discuss whatever that you are asking.” This suggests that Cherry School teachers held a different view from those in Apple and Blueberry Schools. While all schools used technology to provide input during group work, Apple and Blueberry School teachers considered using technology to provide input as a form of technological support for collaborative learning, Cherry School teachers did not share this view, as Gong noted that “students are only consumers” in this context. This implies that she believed this method positioned students as passive recipients of information rather than active collaborators engaging with technology.

8.6.2 Technology Supports Competitive and Cooperative Activities

In addition to creating shared spaces, teachers used technology to foster collaboration through competitive and cooperative activities. Han described dividing the whole class into two groups, where team members took turns answering questions from the games that the teacher presented on the screen. They “worked together” to “compete against” the other team to win. This approach encouraged a spirit of cooperation and active participation among students.

In contrast, Jin’s method required team members to collaborate on answering each question from the game that the teacher presented on the screen. Students had to negotiate, persuade, and reach a consensus as a group. By structuring activities where students had to collectively decide on answers or strategies, technology became a tool for enhancing collaborative decision-making. This approach helped develop students’ teamwork and decision-making skills.

In summary, the shared use of iPad in project classes and team-based competitive games demonstrate that teachers used technology to encourage cooperation, accountability, and the development of negotiation and decision-making skills among students.

8.7 Technology Supports Scaffolded Learning

Teachers felt that, with the help of technology, they were able to provide support and guidance to help students learn and develop skills during tasks. This section reports on five scaffolded learning approaches employed by the teachers with the aid of technology: a) making content visually clear; b) context-embedded learning; c) activating prior learning to support new learning; d) sequencing content; and e) catering to students' learning needs.

8.7.1 Technology Makes Content Visually Clearer

Like the teachers from Apple School and Blueberry School, the Cherry School teachers also believed that presenting content in a visual format could make it clearer and more understandable to students. For example, Ning reported that using technology to present activity requirements for students in a spoken test provided valuable support. He noted that, in addition to verbal instructions, the visual cues on the slides helped students “understand what the teacher wants them to do” (Ning) and navigate the activity prompts during the activity.

In addition, Gong provided an example of how technology helped her make abstract ideas visually clearer to students to support them in understanding the content. As she said, “If I teach about emotions and feelings, some feelings are difficult to explain, but if I could show them a picture or a video, they could understand it.”

Furthermore, Ke emphasised how technology enabled him to clearly depict complex content and effectively communicate information. For instance, he believed that videos allowed for clearer storytelling, as they could capture moments (time), portray physical spaces and locations (place), and combine visual images with audio narration or sound effects (topic). Additionally, videos could organise complex viewpoints in a coherent manner. In this way, he felt that these characteristics collectively contributed

to making the content presented in videos visually clearer, thereby helping students better understand the material. As he explained,

You could put a time, a place, and a topic where a video just shows all of that in one time. Present a topic through real-life scenarios or dynamic activities instead of a book. I feel like that is much better done on a computer compared to through books.

He further added,

Instead of explaining something to students, like an argumentative statement or two people having a dialogue, instead of explaining to them what's going on, it's much better to visually show them. It's easier to understand, and it brought the point over just as easily.

8.7.2 Technology Supports Context-embedded Learning

Like Apple and Blueberry School teachers, Cherry School teachers also used context-embedded learning extensively in their practices. For example, Jin said, "If I'm teaching different kinds of cultures, I will show them a short video so they can see what it's like in different countries." Jin thought videos often depict real-life scenarios, such as daily activities, festivals, and people interactions. She believed the authentic and contextual learning experience could provide a deeper understanding of the cultures.

However, unlike the teachers at Apple School and Blueberry School, Ning went a step further by using technology to create immersive learning experiences, as observed in classroom observations. He designed a simulated stargazing activity to allow students to directly engage with celestial objects in a simulated environment, enhancing their understanding of astronomical concepts. As he said, "When we teach students about the stars or planets, I turn off all the lights and put my projector screen on the roof. We lay down and look for them." Another example he shared was a simulated phone call

conversation. With the help of technology, the teacher turned the phone call dialogue into an actual phone call, which allowed students to practice language usage in real-world communication scenarios. As he said,

When we practice ‘Language in Action’ in the textbook, sometimes, it is a phone call dialogue. I connect my phone to the Seewo IWB. Then, I leave the room and call a student in the class. He comes forward to answer. If he does well, he could choose another student...

Ning’s examples demonstrate how technology supports context-embedded learning by creating realistic and immersive environments that enable students to connect abstract concepts with real-world applications.

8.7.3 Technology Activates Prior Learning to Support New Learning

Similar to the teachers at Apple School and Blueberry School, the teachers at Cherry School also reported using technology to activate students’ prior knowledge in class, enabling them to connect information they had already learnt to new information. For example, Gong described a practice of showing her students an image, such as an animal, on a slide when teaching new vocabulary. She believed that an image of an animal could remind students of background information about that animal. So, when she introduced the animal’s English name, they could add that name to everything they already knew about the animal. Gong explained, “They create a new pathway for themselves. It’s not like I create a whole new animal. Their cognition is that they already have the schema for this animal, and my teaching just adds something onto their schema.” Han provided a similar example. She said that in one of her classes, a video showed real-life scenarios of different jobs. Students “already had some knowledge about these jobs,” and when they learned the English names of these jobs, “they could add those names to what they already knew” (Han). In both examples, the teachers used technology to remind students of their prior knowledge. This approach allowed the teachers to help students make connections between what they learned in

class and what they already knew before class.

8.7.4 Sequencing of Content to Support Learning

The teachers reported that technology enabled them to organise and present content in a logical and progressive order. In this way, students could gradually build upon their understanding of knowledge. The teachers thought PPT allowed for the seamless incorporation of all materials needed for teaching and streamlines the teaching process, which set the foundation for the sequence of content. For example, Jin said she put everything she needed into PPT, so she “didn’t need to use many things in class.” Next, the teachers thought PPT allowed them to structure the content on the slides to make it easier for students to understand the content step by step. For instance, Ke said, “I usually made my PPTs in two ways where it always started from easy to difficult. The easy parts I usually gave to the kids that were not as good in English as the rest, and it built up.” He thought by structuring his PPT this way, he ensured that all students, regardless of their initial proficiency, could follow the lesson and develop their understanding progressively. Moreover, as mentioned in Section 8.5.2, the structured nature of PPT presentations also enabled Ke to incorporate visual markers of progress, such as transitional slides and animation effects, which helped students track their learning journey and feel a sense of accomplishment as they moved through the content.

8.7.5 Technology Enables Teachers to Cater to Students’ Learning Needs

The teachers believed that the integration of technology in the classroom empowered them to address the diverse learning needs of their students more effectively. This section explores how they utilised technology to facilitate the customisation of digital materials, the selection of different tools based on students’ preferences, the conduct of formative assessments, and the provision of feedback at each student’s own pace.

Like some teachers at Blueberry School, the teachers at Cherry School also asserted

that technology enabled them to customise digital materials to meet students' learning needs. For example, Jin shared that by creating her own PPTs, she could ensure the material addressed the areas where students required more support, thereby making learning more effective. As she explained, "I want to do my slides in my own style. I always make my PPT interactive because this could engage students more. And I know which parts my students struggle with and which part I want to focus on."

In addition, the teachers asserted that technology enabled them to choose different tools to meet students' learning preferences in class. Ke shared two examples in which he considered students' learning preferences and selected suitable digital tools to maximise their learning outcomes. In one class, when students read a text about the Bad Art Museum, they showed no interest in it. Ke thought he needed another engaging approach. He, thus, visited the website of Bad Art Museum, allowing students to view and discuss the actual "bad art" that they were reading about. He explained,

[Apart from reading the text] I could play a digital game, like 'it's good art, bad art,' and make them understand. But I think not all kids want to play games. So, I pulled up something on the internet, and kids who are good at art felt they could critique it better and thought, 'Oh, this needs critique.'

In the second example, he applied the same principle of enabling students to choose. He deliberately did not use PPT pictures. Instead, he browsed the internet, allowing students to pick pictures according to their preferences. Reflecting on this, he noted, "Students liked it."

Furthermore, similar to some teachers at Apple School and Blueberry School, the teachers at Cherry School also used technology to conduct formative assessments to identify and cater to students' learning needs, though their specific approach differed. For example, Jin shared an instance where she had students choose the correct options

on the Seewo IWB to check their understanding. She explained, “It’s a quick way to evaluate students individually. So, I had a quick idea, like maybe 50 of them couldn’t spell the words. Now the spelling was terrible. We need to keep practicing this again.” Jin believed that this quick assessment method helped her identify areas where students struggled and needed more practice, enabling timely intervention.

Moreover, Ke believed that providing feedback at each student’s own pace was another significant benefit of using technology in education. He mentioned assigning students pronunciation homework through DingTalk, a communication platform widely used in China for messaging, file sharing, and online collaboration. Students could follow along with the standard audio provided on the platform and then submit their recorded pronunciation to the teacher. Ke found that as soon as a student submitted their homework, he could receive it and provide feedback quickly. He emphasised that this method allowed students to complete their homework at their own pace and receive the feedback they needed promptly, enabling them to make continuous progress.

In summary, teachers at Cherry School used technology to support scaffolded learning through various strategies, i.e., making content visually clearer, embedding learning in real-life contexts, activating prior knowledge, sequencing content, and catering to students’ diverse learning needs.

8.8 Technology Supports Students Skill Development

Teachers also employed technology to support the development of multiple skills in students. This section discusses how the teachers at Cherry School used technology to improve students’ linguistic skills and digital skills, as well as cultivate their research skills, critical thinking, and learner autonomy.

8.8.1 Technology Supports the Development of Student Linguistic Skills

As the primary objective of English language teaching, developing students' linguistic skills was the key focus across all three schools. At Cherry School, teachers employed various technological tools to support this objective. During the interviews, Gong asserted that technology played a significant role in improving students' speaking skills. For instance, Jin explained, "The courseware has an interactive way of asking questions, so students have to ask and answer in groups." She believed that the interactive courseware encouraged group discussions, necessitated verbal communication, and provided students with opportunities to practice their speaking skills. Similarly, as mentioned in Section 8.5.1, Han noted that when students watched videos that they found interesting, "they always had opinions" and shared their thoughts with peers in English. In this example, Han felt that the visual content stimulated students' interest, encouraged their opinions and ultimately supported the development of their speaking skills.

In addition, to improve students' reading skills, all five teachers explained that they used MyOwn, an online library, to assign reading materials that were directly related to the current lessons. Ke and Jin commented that this approach exposed students to relevant vocabulary, broadened their knowledge, reinforced their understanding of the content being taught in class, supported continuous reading practice over a set period, and thus improved students' reading skills.

Furthermore, teachers used technology to support the development of students' writing skills. For example, in a writing lesson, Gong asked students to read a passage on the screen and then had them write something on paper. She then took photos of some students' writing, projected them onto the Seewo IWB, and made corrections on the board. She thought this approach allowed her to provide real-time feedback to students, which helped them remember correct forms and rules more effectively than delayed feedback. As she said in the interview, "When you corrected errors, if

someone made a mistake today and you told them tomorrow that it was a mistake, it's not as fresh. But if you corrected it immediately after students made the mistake, it stayed in their memory longer.”

8.8.2 Technology Supports the Development of Student Digital Skills

The teachers said that the technology used in the teaching process could improve students' digital skills, which “they would need in the future” (Ning). For instance, Gong said, “Sometimes I asked my students to come to the front [of the classroom] and used my laptop to search via an online translator or a dictionary online. So, they were learning digital skills as well.” Similarly, Ning said,

Like for my PPT games or some activities in which students had to come to the board and do something on the board, students learnt to interact with the technology in the classroom. It helped them to learn some digital skills.

The teachers' words show that they believe when students learn with technology, they become familiar with the digital tools and resources available online. They learn to navigate these tools as well as the applications embedded in them, thereby improving their digital skills. Notably, this emphasis on developing student digital skills was unique to this school, as teachers at Apple School and Blueberry School did not highlight this aspect in their interviews.

8.8.3 Technology Supports the Development of Student Research Skills

In the interviews, the teachers said that students using technology in the learning process could improve their research skills. Gong shared an example in which students searched online, generated information, and applied the new information to create their projects. As she said,

When we do a project, every group will have an iPad. They can use that iPad to search for information and use that information for their group project. For instance...in this unit, they're going to make posters about animals. They have

the iPad, and they can search for information about the animals, how to spell words, and how to draw pictures to generate ideas.

She then explained that after they had obtained all the information, they could generate new ideas, thus working on their projects. She thought the iPad did help them search for things and brainstorm.

Ke shared another example of students using technology for research for their homework. He said that students could pursue their interests and curiosity, independently explore questions, and then report their findings to the teacher. As he said,

For instance, they might explore what vacation they would go on and why it's dangerous to not bring sunscreen with you when you're in the desert...How kids come up with the answers is sometimes very funny... I enjoy it a lot because they go way too deep, then they go down this rabbit hole and come out with strange questions and new knowledge.

In this example, the students went through a process of using technology to search for information that they were interested in and might not be available in textbooks. They had to search for information, generate new ideas, and have new findings. In sum, these two examples show that with the help of technology, students develop research skills and enhance their research capabilities. It is notable that this focus on developing student research skills was distinctive at Cherry School and not mentioned by teachers at Apple School or Blueberry School.

8.8.4 Technology Supports the Development of Student Critical Thinking Skills

One teacher, Ke, mentioned that technology helped him develop students' critical thinking skills. As mentioned in section 8.7.5, Ke browsed the Bad Art Museum website to cater to students' learning needs when they were reading about the museum but showed little interest. After browsing the website, the teacher thought that the

students understood the idea of the Bad Art Museum better, and the students that were good in arts felt they could criticise the paintings, which demonstrates the students' critical thinking. In addition, Ke reported that some students thought they could draw better than these online paintings, which indicates a critical reflection on their own abilities compared to what he observed. He shared an example of one student, saying,

One kid even asked me why I would go there before seeing the pictures online. After seeing the pictures, he said, 'I want to go there because I think I can draw better than that.' That was very interesting to me, like a 180-degree switch.

Here, technology facilitated a shift in perspective for at least one student, who went from questioning the value of the museum to wanting to visit it. This change signifies that the student engaged in reflection and reassessment of the new information he encountered. Overall, this example illustrates how teachers used technology to foster students' critical thinking. Interestingly, Ke was the only teacher across all three schools who specifically discussed using technology to develop students' critical thinking skills.

8.8.5 Technology Supports the Development of Student Autonomy

With the help of technology, the teachers reported in the interviews that they were able to discover more opportunities to promote student autonomy. Gong shared an example from her class where she sometimes asked students to use online translators and dictionaries on her laptop to look up new vocabulary, aiming to cultivate their autonomy. As she explained,

They are learning that as a language speaker, sometimes you do not know the names of things in a different language, but you could search for them. So, it also helps them become more independent and not just rely on the teacher to tell them.

Similarly, after class, she encouraged students to use the courseware to assess

themselves while completing their homework. She believed this approach could encourage students to take initiative and take ownership of their learning process. As she noted, “It was more of a self-assessment. When they did corrections, they could see what was wrong, and then they referred to the software to get the correct answer.”

One teacher, Ning, also shared that technology had made it more convenient for him to “include students in teaching.” He explained that “including students in teaching” means allowing students to take on teaching roles and responsibilities, which enhances their learning effectiveness during lessons. Ning believed this approach could help students “learn better” and foster their autonomy, as they take charge of their own learning. Specifically, in his class, he would “let students help students.” As he put it, “If there were students who knew a lot about something, I would give them my pointer and ask them to come and share, maybe even lead a reading of the content.” Ning emphasised that this allowed his students to experience the responsibilities of teaching. He also noted that the Seewo IWB and the laser pointer, which controlled the screen, further supported this process and contributed to the development of student autonomy.

In summary, teachers at Cherry School used technology to support the development of students’ linguistic, digital, research, critical thinking, and autonomous learning skills. Notably, the emphasis on developing digital, research, critical thinking (for one teacher) was unique to Cherry School compared to Apple and Blueberry Schools. The underlying factors contributing to this difference will be explored in detail in Chapter 9.

8.9 Technology Supports with Teaching

The teachers believed that technology played a significant role in supporting their teaching. This section explores how technology contributes to this in the following

ways: a) aiding in lesson preparation, b) assisting in addressing content-related questions during teaching, and c) enhancing teaching efficiency.

This theme was identified as particularly prominent at Cherry School, where teachers provided detailed and consistent accounts of how technology supported their teaching practice, unlike at Apple and Blueberry schools where such discussions were more limited. A detailed comparison of why this theme was more pronounced at Cherry School will be presented in the cross-case analysis (see Chapter 9).

8.9.1 Technology Supports with Lesson Preparing

Three teachers mentioned that technology could help them prepare their lessons. They shared three examples illustrating how technology empowered them to conduct thorough research, enhance lesson planning through visual aids, and create clearly organised presentations. Jin explained that she used technology to research specific topics in depth, allowing her to gain more extensive information and knowledge about the content she would teach. For instance, when teaching about countries, she would research their geographical locations, historical backgrounds, and unique cultural phenomena. “This way,” she said, “when students had questions about that country, I could answer those questions.” Similarly, Ke noted that the process of creating PPT slides was, for him, a form of lesson planning, which made him feel well-prepared when delivering the lesson. Likewise, Ning shared that technology enabled him to create clearly organised presentations that accurately reflected the teaching content. It also helped him design and structure the material to be presented in a step-by-step manner. In summary, these examples demonstrate how the integrated use of technology supports teachers in preparing informed and well-structured lessons.

8.9.2 Technology Supports Content Questions during Teaching

Two teachers expressed that the use of technology supported them in quickly answering students’ questions in class. Ning said, “It’s easy to share the screen from

the phone or laptop to the Seewo IWB. So, if a student has a question, I could easily and quickly search for the answer and share the results with the students.” Ke shared a similar perception and further added that, in the information age, students often perceive internet information as more authoritative than personal knowledge, even if it comes from the teacher. He provided an example to illustrate this. In one of his classes, a student asked him a question; he offered an answer, but the student doubted it. He then quickly found the answer through an online search, which resolved the student’s doubt. Ke believed that this approach swiftly addressed the student’s queries, avoided prolonged and meaningless debates, and allowed the class to quickly return to the core teaching content.

In sum, both examples demonstrate how technology supported teachers in effectively responding to student queries. By leveraging online resources and digital tools, teachers believed their ability to provide accurate information quickly was enhanced, thereby fostering a more high-quality learning experience for students.

8.9.3 Technology Improves Teaching Efficiency

Three teachers believed that technology improved their teaching efficiency. The following three examples illustrate various ways in which technology enhanced their teaching efficiency. Gong noted that tools like PPT could quickly present a large amount of content. The visual aids also provided a clear and concise presentation of the material, along with contextual information, enabling students to grasp the content more quickly. Additionally, she mentioned that pre-prepared slides with text, images, and audio reduced the need to write things out manually during class. Jin added that technology, when used as a tool to assess students’ learning, offered teachers quick feedback on students’ performance. Furthermore, Ning pointed out that the MyOwn e-library allowed teachers to see and track the books students had read. This feature enabled teachers to quickly understand how much students had read and monitor their progress in completing assigned reading tasks. Overall, these examples demonstrate

how teachers perceived that their use of technology streamlined teaching processes, saved time, and providing them with efficient tools to enhance both instruction and assessment.

In summary, teachers at Cherry School found technology instrumental in supporting their teaching by aiding lesson preparation, addressing content-related questions, and improving teaching efficiency.

8.10 Factors

The previous sections discussed how Cherry School teachers perceived and used technology in their teaching. This section shifts the focus to the factors influencing their technology use. Specifically, Cherry School teachers identified factors that they believe support and hinder their use of technology in teaching. These factors encompass teacher-level, school-level, and system-level influences.

8.10.1 Teacher-level Factors

Teacher-level factors pertain to the factors around teachers, such as individual characteristics and perceived competencies of the teachers. In Cherry School context, these include teachers' willingness, agency, technological skills, technology self-efficacy, time constraints, and access to e-resources.

Teachers' willingness to adopt new tools and improve their technological skills, along with exercising their agency, played a role in achieving their goal of effectively integrating technology into teaching through self-directed learning. For example, Gong expressed her willingness, stating, "I am willing to try new tools." Similarly, Jin expressed her openness, saying, "I am very open to learning new technology. I think it is good." In addition, regarding improving their technological skills, Ke and Ning who grew up with technology, felt confident in their technological abilities but were

still keen to learn new technological skills. As Ning said, “I would like to find and learn new ways to incorporate technology even more.” Furthermore, this willingness was further enhanced by the teacher agency that they demonstrated. Three teachers reported that they had taken proactive steps to improve their technological proficiency. Gong had been participating in online professional development courses to gain technological skills and pedagogical knowledge. Han improved his technological skills through online videos, and Jin enhanced her pedagogical knowledge from books and her technological skills from online videos.

Secondly, the teachers thought that their technological skills and technology self-efficacy had a significant impact on their use of technology in teaching. They all believed they had sufficient technological skills to confidently carry out the technology-integrated activities in their class. Unlike the teachers in Apple and Blueberry schools, where there were more mixed views, the teachers in Cherry School all expressed a high level of technology self-efficacy in using their current technology for teaching. However, when asked about their confidence in using a new type of technology for teaching, the teachers expressed varying levels of confidence. Ke was highly confident. Han and Ning thought they were confident to learn and use new technology. In contrast, Gong’s and Jin’s responses indicated a level of comfort and readiness to learn. Gong said, “I was comfortable with it. I felt I had a success rate.” While Jin said, “I was not immediately very confident, because it took me a while to learn, but I was willing to learn.” Together, technological skills and technology self-efficacy are supportive factors for these five teachers’ use of technology, despite Gong and Jin showing relatively less strong self-efficacy in adopting new technologies.

Thirdly, three teachers reported encountering time constraints. Jin and Ning noted that preparing PPTs sometimes takes up time. When there was a shortage of time, they preferred to use existing PPTs, editing and changing them as needed. Meanwhile, Han indicated she faced time constraints during class, as she said, “Sometimes 40 minutes

is not enough if you have an interactive class, but we make do with what we have.” However, the issue of time constraints (including both time for lesson preparation and for class) appeared to be less significant at Cherry School, as it was raised by only three teachers.

Fourthly, readily available digital resources were considered a supportive factor in the teachers’ use of technology in their teaching. The teachers mentioned that the school purchased educational resources, as introduced in Section 8.2, which the teachers could use for free. In addition, Jin mentioned that she bought many good-quality PPT templates, while Ke said his technological skills are quite good, and he knew how to optimise his search online to find good free resources.

8.10.2 School-level Factors

School-level factors encompass the environment and resources provided by the school, including technology availability, technical support, training, the school administration’s attitude toward technology use, school policies including class size and subject teaching time, teacher collaboration, and interpersonal influence among teachers regarding technology use.

The teachers reported that technology availability in their schools supported their teaching with technology. They noted that their school had a strong technology infrastructure, purchased educational resources (see Section 8.2), and had installed the Airplay application on Seewo IWBs, which facilitates easy connections between laptops, phones, and the Seewo IWBs. They felt these measures provided them with necessary tools and resources for teaching.

Technical support also seemed to play a role in shaping the teachers’ experiences using technology. Two teachers, Han and Jin, mentioned encountering technical issues. Han noted that the Wi-Fi connection was sometimes unstable, though she had

not experienced any computer breakdowns. Meanwhile, Jin shared an incident where her PPT file failed to open on the Seewo IWB during a class. Fortunately, the school was well-resourced, and she was able to use the courseware on the Seewo IWB to continue the lesson. Nevertheless, she still felt that such issues could negatively affect her class. On the other hand, the other three teachers did not report any technical issues in their lessons. Two teachers mentioned that they were able to troubleshoot technical issues themselves. Additionally, for teachers who could not resolve problems on their own, the school provided an IT staff member to address such issues after class. In summary, while technical issues were a hindrance for teachers who encountered them and were unable to resolve them independently, the school's IT staff and repair mechanisms served as supportive factors, enabling teachers to continue using technology.

Teachers further reported that training influenced their use of technology for teaching. At Cherry School, the training programs primarily focus on pedagogical development. The EFL head reported that the school often invited educational experts to conduct training sessions, during which they share their research findings and insights in the field of education. However, the EFL head also mentioned that the school did not offer specific training programs to improve teachers' technological skills. As a result, teachers needed to take the initiative to learn and enhance their technological proficiency independently if they wanted to improve their skills. Some teachers did that, which demonstrates their agency.

Beyond tangible support, intangible factors, particularly administration's attitudes, school policies, and interpersonal dynamics among teachers, also seemed important. At Cherry School, the administration's positive stance toward technology tended to create a supportive environment for teachers' technology integration efforts. For instance, when introducing projectors to the school, the principal opted for mobile projectors (unlike public schools, which use projectors fixed on Seewo IWBs) to

enhance teachers' instructional flexibility. Additionally, the principal mentioned considering the introduction of AI automatic grading software for students' written homework to save teachers' time on grading. Furthermore, particularly for the English subject, he approved the purchase of user accounts for Twinkl, which enabled EFL teachers to download high-quality, ready-made PPT templates from the Twinkl website. He also made the decision to introduce MyOwn, the student online library reading system, which allowed students to learn English independently without direct teacher involvement.

Two teachers also reported the influence of school policy on their use of technology in teaching. Gong believed that there was a requirement tied to teaching standards that mandate the teachers' use of technology. She stated, "They would grade you on this aspect," which compelled her to integrate technology into her teaching. However, other teachers did not mention this policy. On the other hand, Jin pointed out that the school has a policy aimed at protecting students' eyesight, specifying the number of minutes teachers should dedicate to non-technology-based activities to limit students' screen time. As a result, school policies encompassed aspects that both supported and restricted teachers' use of technology in the classroom.

Five teachers further mentioned that teacher collaboration played a significant role in helping them use technology in class. They shared high-quality digital resources with one another. In addition, some teachers of the same grade collaboratively created grade-specific PPTs. Furthermore, the Chinese and foreign teachers responsible for the same class also planned lessons together. They exchanged ideas on lesson design, observed each other's teaching provided feedback on each other's class, regarding the use of technology.

However, Cherry School teachers were less likely to be influenced by indirect interpersonal influence regarding technology use, compared to teachers at Apple and

Blueberry Schools. Only one teacher, Ning, mentioned that he would be influenced by his colleagues' technology use. The other teachers indicated that they were not affected by this factor, because students' needs and lesson needs were their prioritised considerations.

8.10.3 System-level Factors

The system-level factors encompass broader educational policies and societal influences, including the educational system and parents. In terms of the educational system, Ke mentioned that the rigid structure of the educational system was a barrier. As he stated, "That's the problem. No one wanted to move on to something new." According to him, the rigid educational system impeded more innovative use of technology. In contrast, the other teachers did not perceive this as a hindrance. For example, Han said, "In my class, we were free to do whatever we wanted to do in the classroom." Thus, the rigid educational system was seen as a barrier by Ke, but not by others. These teachers felt, under the framework of the school's curricula, they had freedom to implement their preferred teaching approaches.

In addition, three teachers mentioned that parents' attitudes had influenced their use of technology. Building on Ke's earlier concerns about educational rigidity, he shared a specific incident where parents directly interfered with his innovative teaching methods. He had planned to adopt a flipped classroom approach but faced opposition from his students' parents, who demanded a return to traditional teaching methods where teachers taught and dominated the class. This parental resistance reinforced his view that systemic barriers limit teachers' ability to use technology innovatively.

Beyond such direct interference, teachers also identified a more widespread parental concern: students' eye strain. They explained that parents generally did not oppose the use of technology in the classroom but were wary of their children using computers for extended periods after class. For instance, some parents felt that their children

should not spend too much time reading MyOwn books. As a result, the teachers had adjusted their practices by assigning MyOwn reading tasks within limits acceptable to most parents. This concern about eyesight was also reflected in the educational policy and raised by teachers at Apple and Blueberry schools. In sum, parental views created impediments for Cherry School teachers, ranging from direct opposition to innovative methods to more subtle constraints on extended technology use.

8.11 Chapter Summary

This chapter explored how Cherry School teachers perceived and used technology, as well as the factors that influenced their use of technology in teaching, contributing qualitative evidence to address the gaps in the literature regarding the need for concrete examples of how primary school EFL teachers use technology in their practice (see Sections 2.2.4 and 2.3.5). The teachers generally viewed technology as a valuable tool that could benefit their teaching while recognising certain constraints, such as the potential to distract students from learning and reduce student interaction and communication in group work. Additionally, unlike teachers at Apple and Blueberry Schools, Cherry School teachers emphasised that technological knowledge was as important as pedagogical knowledge and viewed technology as an essential component of their instruction.

This chapter then detailed how teachers used technology and their rationales for its use. For example, they utilised technology to capture students' attention and make learning more enjoyable. They motivated students by making learning fun, catering to multiple senses, and providing a sense of progress and accomplishment. Also, they used technology to make content visually clearer, embed learning in context, activate prior knowledge, and arrange content from easy to difficult to support students' learning.

Furthermore, teachers at Cherry School used technology to support the development of various student skills, including linguistic, digital, research, critical thinking, and learner autonomy. This highlights that Cherry School focused on cultivating a broader range of student skills compared to Apple and Blueberry Schools. Moreover, teachers at Cherry School highlighted how technology supported their teaching by aiding in lesson preparation, addressing content-related questions, and improving teaching efficiency.

Finally, this study revealed that the teachers' technology use was shaped by a complex web of factors. At the teacher level, positive influences seemed to include their willingness to try new tools, their confidence in their technical skills, and their initiative to learn independently. Teachers reported that time constraints in preparing technology-based lessons were a constraint. At the school level, strong support from the school principal, the availability of technology and digital resources, and collaboration among teachers appeared to encourage technology use. However, technical problems and school policies, such as those designed to limit student screen time, sometimes acted as barriers. Finally, at the system level, some parents' concerns about screen time and their preference for a teacher-dominated teaching approach tended to limit how teachers could use technology in their classrooms.

Chapter 9 Combining Data Sources

9.1 Introduction

This chapter aims to present the key findings of the study by integrating insights from individual case studies and combining both quantitative and qualitative data sources. Data from the three case schools are first compared to identify common patterns, differences, and relationships within the cases, providing a richer description and deeper understanding of the research phenomena (Duff, 2008; Stake, 2013). Next, qualitative and quantitative findings are synthesised and compared to achieve a more complete understanding of the research phenomena (Creswell & Plano Clark, 2017). Accordingly, this chapter first presents the cross-case analysis, followed by the integrated findings from quantitative and qualitative data.

9.2 Cross-Case Analysis

This section compares findings across the three case schools to identify commonalities and differences in how teachers in each of the three schools perceived and used technology, as well as the factors that influenced their use of technology in teaching. The thematic analysis identified a total of seven themes. Table 9.1 presents these seven themes and their applicability across the three schools. A checkmark (√) indicates that the theme applies to the school, while an empty cell denotes that it is not applicable, providing a clear overview of thematic distribution. Following this, each theme is discussed sequentially.

Table 9.1

Overview of the Themes across the Three Case Schools

Theme	Apple	Blueberry	Cherry
1. Teachers' attitudes toward the role of technology in teaching differed across the three case schools.	√	√	√

Theme	Apple	Blueberry	Cherry
2. Teachers considered technology useful for engaging and motivating students.	√	√	√
3. Teachers considered technology useful for supporting collaborative learning.	√	√	√
4. Teachers considered technology useful for supporting scaffolded learning.	√	√	√
5. Teachers considered technology useful for supporting students' skill development.	√	√	√
6. Teachers had mixed views on the relationship between technology and students' academic performance and oral English proficiency.	√	√	
7. Teachers considered technology useful for supporting their teaching.			√

9.2.1 Teachers' Attitudes towards the Role of Technology in Teaching

The teachers' attitudes towards the role of technology in teaching differed across the three case schools. While all teachers from the three schools discussed both the advantages and disadvantages of technology (see Sections 6.4.1, 7.4.1, and 8.4.1), their attitudes towards its role in teaching varied. Teachers at the two public schools, Apple and Blueberry, prioritised teaching approaches over the use of technology and believed pedagogical knowledge to be more important than technological knowledge (see Sections 6.4.3 and 7.4.3). However, there were subtle differences between the two schools.

While Apple School teachers primarily viewed technology as a delivery tool, seeing it as supplementary to their teaching (see Section 6.4.2), Blueberry School teachers held mixed views (see Section 7.4.2). At Blueberry School, some teachers saw it primarily as a supplementary tool for presenting content, while others believed it could go beyond functioning as a delivery tool, serving also as a supportive tool to enhance interactions and meet specific instructional needs (see Section 7.4.2). Blueberry

School teachers, particularly newer teachers who received recent training in current technologies, demonstrated greater teacher agency in designing their lessons and using technology to support their teaching, compared to experienced teachers with limited training in current technologies (see Section 7.4.3).

In contrast, teachers at Cherry School viewed technology as a necessary and core component of their teaching (see Section 8.4.2). They regarded technological knowledge as equally important to pedagogical knowledge and considered that many of their teaching activities would not be possible without technology (see Section 8.4.3).

Taken together, while all teachers across the three schools considered both the advantages and disadvantages of technology, their attitudes towards its role in teaching varied. Apple School teachers primarily viewed technology as a supplementary delivery tool, while Blueberry School teachers held mixed views, seeing it as either supplementary or supportive. In contrast, Cherry School teachers regarded technology as a necessary and core component of their teaching. This pattern of variation echoes the literature reviewed in Section 2.3, where teachers' use of technology varies between a supplementary "add-on" and a more transformative pedagogical practice. In addition, these findings regarding teachers' views on the role of technology complement the existing literature on teachers' perceptions of its benefits and challenges and potentially offer an explanation for the persistent gap highlighted in the literature between how teachers perceive technology and their actual use of it in class (see Section 2.2).

9.2.2 Technology Engages and Motivates Students

The teachers across the three schools considered technology useful for engaging and motivating students. They employed shared strategies to enhance student engagement while adapting to their specific classroom contexts (see Sections 6.5.1, 6.5.2, 7.5.1,

and 8.5.1). Teachers from all three schools employed multimodal elements to make learning more interesting. They also utilised game-based learning to foster active student participation. Additionally, the Seewo IWB was used to bridge passive and active learning, and to enable student-technology interaction.

However, the schools also had different approaches to engaging students. Both Apple and Blueberry Schools utilised technology-supported TPR and technology-supported peer assessment to engage students. In contrast, Cherry School teachers integrated open-ended tools like online dictionaries and the Internet to spark students' deeper thinking and facilitate their discussion in class.

In addition to engaging students, the teachers from Blueberry and Cherry Schools employed technology to enhance student motivation (see Sections 7.5.2, and 8.5.2). Blueberry School prioritised gamification to transform rote tasks into fun challenges that motivated students. Cherry School adopted approaches to make learning entertaining (e.g., PPT games, music) and to show students their progress (e.g., transitional slides) to motivate students.

Overall, teachers from all three schools utilised technology to engage and motivate students and shared many similarities. The differences lie in that while Apple and Blueberry School teachers employed more structured, teacher-guided strategies, Cherry School teachers, who also adopted similar approaches, extended them by leveraging technology's potential to stimulate deeper learning and open-ended discussions among students. Additionally, teachers at Cherry School reported using more strategies to motivate students compared to their counterparts at Apple and Blueberry Schools. For instance, they used transitional slides to mark progress through content, giving students a sense of accomplishment as they moved through lessons.

Cherry School teachers' practices for creating engaging and motivating classes were supported by the availability of technology, principal support, teachers' perceptions of the role of technology in teaching, their technological skills, and technology self-efficacy. For example, these teachers integrated open-ended tools like online dictionaries and the Internet to spark deeper thinking and facilitate discussions among students (see Section 8.5.1). This was made possible by the school principal's provision of laptops to teachers and the ease of connecting these devices to the Seewo IWB via the AirPlay application (see Section 8.10.2). Crucially, the teachers at Cherry School viewed technology not just as a delivery tool but as a necessary component of their teaching (see Section 8.4.2). This perception, combined with their technological skills and technology self-efficacy, and the supportive environment of available resources, enabled them to integrate technology in more sophisticated ways.

Taken together, these findings confirm that technology serves as a potent tool for engaging and motivating students, aligning with the pedagogical benefits identified in Section 2.2.1. Specifically, the diverse pedagogical repertoire identified here echoes the varied practices of technology-supported instruction reviewed in Sections 2.3.1 and 2.3.2. However, this study also extends the literature by identifying both shared patterns and divergent approaches to technology integration across different school types (public versus private) within the Chinese primary EFL context. The analysis of these divergent approaches suggests that while teachers' technological skills and technology self-efficacy are important, the combination of these factors with the perception of technology as more than a delivery tool, and school-level factors such as access to varied digital tools can support and empower teachers to employ more complex approaches to engage and motivate students.

9.2.3 Technology Supports Collaborative Learning

The teachers across three schools considered technology useful for supporting students' collaborative learning. They consistently employed it for this purpose and

tailored their approaches to their specific classroom contexts (see Sections 6.6, 7.6, and 8.6). While teachers at Apple and Blueberry Schools used technology in highly similar ways to support students' collaborative learning, those at Cherry School adopted different approaches (see Sections 6.6, 7.6, and 8.6). Apple and Blueberry School teachers utilised technology to support student group work, such as "role-play" and conducting information gathering surveys, helping them practice target language structures with peers of different ability levels (see Sections 6.6.1 and 7.6.1). Beyond group work, teachers at both schools also used PPT slides to display assessment criteria to support peer assessment (see Sections 6.6.2 and 7.6.2). In addition, teachers used the interactive features of Seewo IWBs to enable students to engage with digital content and assess their peers (see Sections 6.6.2 and 7.6.2).

Compared to their counterparts at Apple and Blueberry Schools, Cherry School teachers held a different perception of technology-supported collaborative learning. They believed that when technology was merely used as a prompt for the activity, it did not constitute true technology-supported collaborative learning, as students were consumers rather than active users of technology (see Section 8.6.1). As a result, apart from project classes where students used iPads to create projects with their group members, the teachers felt that technology was not frequently employed for collaborative learning in their daily lessons (see Section 8.6.1). Still, two teachers reported that they utilised team-based competitive digital games (see Section 8.6.2).

Overall, while teachers at all three schools utilised technology to support collaborative learning, their approaches and perceptions varied. Apple and Blueberry School teachers considered that when technology was involved in collaborative learning, this constituted technology-supported collaborative learning, even when it played a minimal role, such as providing prompts. In contrast, Cherry School teachers perceived technology-supported collaborative learning as occurring only when technology was more integrated into the activities.

Technology availability served as an enabling factor for teachers at Apple, Blueberry, and Cherry Schools. They could use tools like PPT, regular IWBs, Seewo IWBs, and iPads to run different group activities. Conversely, limited access to these tools restricted their ability to implement such activities effectively. For instance, some classrooms at Apple School lacked Seewo IWBs, impeding teachers from using the interactive functions. Similarly, since teachers at Apple and Blueberry Schools didn't have iPads, students at these schools could not use them for group work.

In addition, the school curriculum served as a significant influencing factor. At Cherry School, the curriculum integrated both the national curriculum and the International Baccalaureate Primary Years Programme, and the latter enabled students to use iPads for creative projects (see Section 8.2). In contrast, project-based classes are not included in the national curriculum and therefore were not implemented at Apple and Blueberry Schools.

Next, teachers' technological skills, technology self-efficacy, and recent training in current technologies also influenced their use of technology for collaborative learning. Teachers, like Chen and Feng at Blueberry School, who had extensive teaching experience but lacked recent training in current technologies, struggled to incorporate newer tools like the Seewo IWB into their teaching (see Section 7.10.1). Chen, though comfortable using PPT, lacked the advanced technological skills needed to operate the Seewo IWB, and Feng also felt she was not proficient in using interactive technologies (see Section 7.10.1). Accordingly, they felt that they did not possess enough technology self-efficacy to teach with Seewo IWBs (see Section 7.10.1). In contrast, Cherry School teachers, recently trained in current technologies, reported high technological skills and technology self-efficacy, which encouraged them to incorporate technology into collaborative activities (see Section 8.10.1).

Therefore, technological training at the three schools served as a supportive factor in facilitating technology use. It enabled teachers to develop the technological skills necessary to conduct collaborative learning activities outlined in this section.

Unfortunately, teachers perceived that technological training at their schools was insufficient, as most training focused on pedagogical rather than technological skills (see Sections 6.10.2, 7.10.2 and 8.10.2). At Apple School, some technological training sessions were informal, while at Blueberry School, technological training was usually only available for teachers under the age of 45. This made it more difficult for teachers older than 45 to learn new tools and improve their technological skills.

Furthermore, in pedagogical training, teachers reported that technology was often used as a delivery tool, which may have reinforced teachers' perception of technology primarily as a means for delivering content rather than as a platform for more interactive, student-centred activities. However, for Cherry School where training sessions were primarily pedagogical rather than technological, teacher agency appeared to play a crucial role in their use of technology, as teachers actively engaged in self-directed learning to improve their technological skills (see Section 8.10.1).

Furthermore, teachers' familiarity with existing teaching approaches and time constraints also influenced their choices. For example, Ann and Chen at Blueberry School had access to Seewo IWBs in their classrooms, yet they hesitated to transition from PPT to the Seewo IWB, noting that shifting away from an established teaching approach required effort and courage (see Section 7.10.1). This hesitation was compounded by time constraints for lesson preparation. For example, Ann at Blueberry School cited time constraints outside the classroom as a challenge, explaining that she only had weekends to explore and learn how to use the Seewo IWB, making the transition difficult (see Section 7.10.1).

Taken together, the use of technology for collaborative learning at Apple, Blueberry, and Cherry Schools was shaped by multiple factors. Technology availability, teachers'

technological skills, technology self-efficacy, and the recent technical training in current technologies supported teachers' collaborative learning activities when adequately available. Conversely, factors such as a lack of access to technology and inadequate technological training, restricted teachers' use of technology in class. In addition, school curriculum, teachers' familiarity with existing teaching approaches and time constraints also played a role.

9.2.4. Technology Supports Scaffolded Learning

Teachers across the three schools viewed technology as useful for supporting scaffolded learning. They employed technology to support a range of scaffolded learning strategies. While some strategies were common across all three schools, others were shared by only two schools or unique to a single school.

Teachers in three schools shared four scaffolded learning strategies using technology: a) making content visually clear, 2) supporting context-embedded learning, 3) activating prior learning to support new learning, and 4) supporting formative assessment to enhance learning. The teachers' rationale was that technology has the potential to make content, especially abstract ideas, visually clear, attract students' attention, provide context, activate prior knowledge, facilitate student understanding, and enable students to interact with digital content (see Sections 6.7, 7.7, and 8.7).

A comparison of Apple School and Blueberry School shows that newer teachers at Blueberry School, who received recent training in current technologies, utilised more scaffolded strategies (see Sections 6.7 and 7.7). This finding aligns with those reported in Section 9.2.1, which notes that, among Blueberry School teachers, those who received recent training in current technologies demonstrated greater teacher agency in designing lessons and using technology to support their teaching.

In addition, through a comparison of the scaffolded learning strategies employed by

teachers at the three schools, it was found that Apple and Blueberry School teachers employed more structured, teacher-guided strategies, where technology primarily served as a delivery tool to support and complement the teachers' instructional methods (see Sections 6.7 and 7.7). For example, teachers utilised technology to emphasise key points by circling on the board, color-coding, or using magnifying tools. Similarly, teachers supported students' speaking practices using visual cues such as images, videos, sentence structures, or model sentences.

In contrast, while Cherry School also incorporated similar teaching strategies using technology, some teachers went a step further by integrating technology to facilitate more open-ended activities and student-centred approaches (see Section 8.7). For example, teachers from all three schools reported using technology to support context-embedded learning (see Sections 6.7.2, 7.7.3 and 8.7.2). Specifically, they utilised visual aids and authentic scenarios to ground abstract knowledge in familiar contexts. Nevertheless, Ning at Cherry School uniquely extended this strategy through immersive simulations (e.g., Ning's stargazing activity and phone call activity), which transformed abstract concepts into experiential learning (see Section 8.7.2). In addition, across three schools, teachers used technology to conduct formative assessments to identify and address students' learning needs in real time (see Sections 6.7.5, 7.7.7 and 8.7.5). While most teachers at Apple and Blueberry Schools focused on collaborative error corrections, teachers at Cherry School often incorporated technology-supported individualised assessments for immediate knowledge gaps (see Sections 6.7.5, 7.7.7 and 8.7.5). Furthermore, both Blueberry and Cherry School teachers used technology to customise digital materials to meet students' learning needs. While Blueberry School teachers followed a conventional customisation approach (see Section 7.7.1), one teacher, Ke from Cherry School, adopted a distinctive approach. He deliberately did not use PPT pictures in his slides and instead browsed the internet during class, allowing students to pick pictures according to their preferences (see Section 8.7.5). These approaches went beyond the common use of

technology as a delivery tool, demonstrating a more innovative, experiential and student-centred approach.

Technology availability serves as a foundational factor influencing the implementation of technology-supported scaffolded learning strategies across the three schools. For example, Cherry School's innovative approaches, such as integrating a mobile projector into their practice to simulate a starry sky (see Section 8.7.2) or browsing the internet to allow students to select pictures based on their preferences (see Section 8.7.5), would not have been feasible without the principal's decision to provide key tools like mobile projectors and easy laptop-to-IWB connectivity via the AirPlay application.

School curriculum, exam pressure and time constraints also shaped teachers' instructional choices. Teachers at Apple and Blueberry Schools (public schools) reported feeling pressure to prepare students for exams, which influenced their decisions regarding technology use (see Sections 6.2 and 7.2). For example, Ann from Blueberry School mentioned that exam pressure often compelled her to dedicate the final minutes of each lesson to reviewing homework, rather than focusing on other engaging learning activities. In contrast, Cherry School teachers, who had the benefit of a dual curriculum, multidimensional assessment methods, lower exam pressure, and a higher number of weekly English lessons, and slightly smaller class sizes, had greater flexibility to support students' scaffolded learning in various ways (see Section 8.2).

Furthermore, recent technological training was found to influence teachers' use of technology at Blueberry School. Newer teachers who received up-to-date training employed more scaffolded learning strategies compared to their colleagues who lacked the recent training.

Taken together, these findings align with the literature that technology plays a vital role in supporting teachers’ instructional scaffolding (see Section 2.3.3). The diverse scaffolding repertoire identified across the three schools echoes the varied practices documented in the literature (see Sections 2.3.3.1 to 2.3.3.6). However, similar to the findings on student engagement, this study identifies both shared patterns and divergent paths in how scaffolding is enacted across different school types in the Chinese primary school EFL context. Specifically, teachers at Apple and Blueberry Schools primarily utilised structured, teacher-guided strategies, with technology serving as a delivery tool to support and enhance their instructional methods. In contrast, while teachers at Cherry School employed similar technology-supported teaching strategies, they went further by integrating technology to enable more open-ended, student-centred activities. This variation was influenced by factors such as technology availability, teachers’ recent training in current technologies, exam pressure and time constraints in class.

9.2.5 Technology Supports Student Skill Development

Teachers across three schools viewed technology as useful for developing students’ skills. They utilised it to foster a range of students’ skills. While certain skills were common across all schools, others were shared by only two schools or specific to a single institution. Table 9.2 displays the skills that teachers reported cultivating in students through technology at each school, with a “√” mark indicating their application in the corresponding school.

Table 9.2

Overview of Student Skills Cultivated in the Three Case Schools

Skill	Apple	Blueberry	Cherry
Linguistic skills	√	√	√
Meta-cognitive awareness*	√		
Autonomy		√	√

Digital skills			√
Research skills			√
Critical thinking *			√

**Note.* Mentioned by only one teacher at the respective school.

A comparison of the three schools reveals that linguistic skills, as expected in a language teaching context, were a shared focus across all three schools (see Sections 6.8.1, 7.8.1, and 8.8.1). Teachers at Apple and Blueberry Schools also cultivated meta-cognitive awareness and student autonomy (see Sections 6.8.2 and 7.8.2) respectively. At Apple School, Xue employed technology-supported peer assessment to foster students' meta-cognitive awareness, encouraging them to reflect on their learning processes, as one of the few reported cases in the school (see Section 6.8.2). At Blueberry School, Lin used technology to foster student autonomy by letting them choose the order of learning content during class, a practice not widely reported among her colleagues. Nevertheless, encouraging students to review learning at home, particularly by undertaking listening activities via Ding Talk, a communication platform widely used in China for messaging, file sharing, and online collaboration, was more common (see Section 7.8.2).

In contrast, teachers at Cherry School focused not only on linguistic skills but also on developing a wider range of competencies, including student autonomy, digital skills, research skills, and critical thinking (see Section 8.8). For instance, Ning had students lead reading sessions or share knowledge with the class using tools like the Seewo IWB and laser pointers (see Section 8.8.5). He granted students more autonomy in these tasks, with his goal to develop students' awareness and capacity for independent learning. Similarly, Gong let students use her laptop, which was connected to the Seewo IWB, for online translator/dictionary searches, aiming to help them develop digital skills while acquiring new vocabulary (see Section 8.8.2).

Overall, teachers at all three schools focused on developing students' linguistic skills, with Apple and Blueberry School teachers primarily fostering language-related competencies, whereas Cherry School teachers cultivated a broader range of skills. This difference stems from variations in the curricula across the schools. Apple and Blueberry Schools, adhering to the Chinese national curriculum, prioritised students' linguistic skills to meet examination requirements (see Sections 6.2 and 7.2). In contrast, Cherry School's dual curriculum, which integrated the Chinese national curriculum with the International Baccalaureate (IB) framework, encouraged a broader range of developmental goals, including digital skills, research skills, and critical thinking, by emphasising inquiry-based and student-centred learning (see Sections 8.2 and 8.8).

Taken together, these findings confirm that technology is used to foster a range of competencies beyond basic linguistic skills, aligning with the literature on teachers' use of technology to cultivate student skills (see Section 2.3.4). However, a significant contribution of this research lies in its empirical contextualisation of this within the primary school EFL setting, a domain previously underrepresented compared to secondary and higher education (see Section 2.3.4.5). Specifically, this study reveals that in the Chinese primary EFL context, the cultivation of these skills is not uniform but follows divergent paths determined by school type, with institutional curricular frameworks being the most impactful factor.

9.2.6 The Relationship between Technology and Student Academic Performance and Oral English Proficiency

The relationship between technology and students' academic performance and oral English proficiency revealed varying perspectives across the three schools. In Apple School, teachers held mixed views on both topics (see Section 6.9). Regarding academic performance, some believed technology played a minimal role, emphasising

the importance of individual effort and teaching methods, while others argued that their ways of using technology could enhance students' academic performance (see Section 6.9.1). Similarly, on oral English proficiency, opinions were divided: some teachers felt that technology could improve pronunciation accuracy and even oral fluency by exposing students to authentic language in simulated scenarios, such as through video clips or animations, while others stressed that oral fluency depended more on teacher instruction than on technology (see Section 6.9.2).

Blueberry School teachers also expressed divergent opinions (see Section 7.9). On academic performance, some attributed success primarily to teaching methods, while others viewed technology as a supplementary tool that could enhance learning both in and outside the classroom (see Section 7.9.1). Regarding oral English proficiency, most teachers believed that audio and video resources could improve students' oral skills, whereas the EFL head argued that teacher guidance was more critical, with technology playing a minimal role (see Section 7.9.2).

In contrast, Cherry School teachers did not discuss the relationship between technology and academic performance. This may be because when a school places greater emphasis on exam performance, teachers may be more inclined to discuss how technology impacts students' academic performance. This may explain why teachers at Apple School and Blueberry School discussed the relationship between technology and academic outcomes. However, Cherry School focused less on direct academic performance metrics compared to Apple School and Blueberry School. This suggests that the emphasis on exams may influence teachers' understanding and discussion of the role of technology, as well as the setting of teaching goals—whether they focus more on students' linguistic development and exam performance or on the development of other skills.

9.2.7 Technology Supports Teachers' Teaching

The role of technology in supporting teaching was identified as a significant theme in Cherry School but was not explicitly highlighted as a theme in Apple School or Blueberry School. In Cherry School, teachers discussed how technology aided their teaching in three key areas: lesson preparation, addressing content-related questions during teaching, and improving teaching efficiency (see Section 8.9). In contrast, while some teachers at Apple and Blueberry School mentioned that technology helped them with lesson preparation and improved teaching efficiency, these discussions were limited and did not form a cohesive theme, as guided by principles of thematic analysis (Braun & Clarke, 2022). Furthermore, integrating technology to address content-related questions during teaching, as seen in Cherry School, was unique and not observed in the other two schools. This practice highlighted technology's role as a dynamic source of information, enabling teachers to quickly access and share accurate answers with students in real time.

Addressing class questions in real time demonstrates how teachers at Cherry School, equipped with technological skills and technology self-efficacy, integrated technology in more complex ways. This capability was also supported by robust technological infrastructure, including AirPlay integration and school-provided laptops, which allowed teachers to seamlessly connect their devices to the Seewo IWB, making search for and sharing answers quick and effortless.

In addition, teachers' attitudes toward the role of technology in teaching influenced their use of it. They viewed technology not merely as a delivery mechanism but as an integral part of teaching, which was different from Apple and Blueberry School teachers. For example, as Ke reflected, in contemporary society, students often perceive answers found on the internet as more authoritative than those provided by teachers (see Section 8.9.2). In response, Ke embraced this reality, treating the internet as a source of authoritative knowledge and taking on the role of a facilitator

and monitor.

Consequently, these factors, including technology availability, teachers' technology skills, technology self-efficacy, their attitudes towards the role of technology in teaching, enabled Cherry School teachers to harness technology as an interactive and lively teaching resource.

9.2.8 A Summary of Findings across the Schools

Table 9.3 presents a comparison of the seven thematic analysis themes, summarising key findings and differences across the three case schools.

Table 9.3*Summary of the Findings across Three Schools*

Theme	Apple School	Blueberry School	Cherry School	Influencing Factors
1. The teachers' attitudes towards the role of technology in teaching differed across the three case schools.	1) Recognised technology's pros and cons; 2) Viewed technology as a supplementary tool to deliver content	1) Recognised technology's pros and cons; 2) Held mixed views: some saw technology as supplementary, others as supportive for interaction	1) Recognised technology's pros and cons; 2) Viewed technology as a necessary, core component to their teaching approaches	Not discussed in this theme.
2. The teachers considered technology useful for engaging and motivating students.	1) Multimodal elements to engage students 2) Structured and teacher-led activities to encourage students' participation (e.g., technology-student interaction).	1) Multimodal elements to engage students 2) Structured and teacher-led activities to encourage students' participation (e.g., technology-student interaction). 3) Game-based learning to motivate students	1) Multimodal elements, game-based learning and technology-based interactive activities to engage students and foster participation 2) Open-ended activities to foster students' discussion and deeper thinking (e.g., browse the internet to facilitate discussion) 3) More motivation strategies to inspire learning	Availability of technology, technological skills, technology self-efficacy, willingness to adopt new tool, perceptions of the role of technology in teaching

Theme	Apple School	Blueberry School	Cherry School	Influencing Factors
3. Teachers considered technology useful for supporting collaborative learning.	<p>1) Used group work and technology-supported peer assessment.</p> <p>2) Considered technology to support collaborative learning even when it merely served as a prompt</p>	<p>1) Used group work and technology-supported peer assessment.</p> <p>2) Considered technology to support collaborative learning even when it merely served as a prompt</p>	<p>1) Focused on active technology use (e.g., iPad-based project).</p> <p>2) Believed true technology-supported collaborative learning required active student interaction with technology</p>	<p>Technology availability, curriculum, teachers' technological skills, technology self-efficacy, recent training in current technologies, technological training, teachers, familiarity with existing teaching approaches, and time constraints for lesson preparation</p>

Theme	Apple School	Blueberry School	Cherry School	Influencing Factors
4. Teachers considered technology useful for supporting scaffolded learning.	1) Structured, teacher-guided strategies where technology primarily served as a delivery tool to support and complement the teachers' instructional methods	1) Structured, teacher-guided strategies where technology primarily served as a delivery tool to support and complement the teachers' instructional methods 2) Wider application of scaffolded learning strategies by Blueberry's newer teachers with recent training	1) Structured, teacher-guided strategies where technology primarily served as a delivery tool to support and complement the teachers' instructional methods 2) Open-ended, more student-centred approaches	Technology availability, recent training in current technologies, exam pressure, time constraints in class
5. Teachers considered technology useful for supporting students' skill development.	Linguistic skills, meta-cognitive awareness (one teacher)	Linguistic skills, student autonomy	A broader range (linguistic skills, student autonomy, digital skills, research skills, and critical thinking).	Curriculum; exam pressure

Theme	Apple School	Blueberry School	Cherry School	Influencing Factors
6. Teachers had mixed views on the relationship between technology and students' academic performance and oral English proficiency.	Held mixed views: some teachers believed technology was irrelevant, other thought technology could enhance performance and oral English when used in specific approaches.	Held mixed views: most saw it as a helpful supplement, enhancing learning when paired with effective teaching methods, others prioritised teacher guidance over technology	N/A	N/A
7. Teachers considered technology useful for supporting their teaching.	N/A	N/A	Technology, which was viewed as a dynamic source, supported teaching in lesson preparation, addressing content questions in real-time, and improving efficiency.	Technology availability, teachers' technology skills, technology self-efficacy, teachers' perception of the role of technology in teaching

9.3 Merging Quantitative and Qualitative Findings

This section integrates quantitative and qualitative findings using a convergent parallel design, as outlined by Creswell and Plano Clark (2018). In this approach, findings from different data sources are synthesised and compared to gain a complete understanding of the research phenomena. As discussed in Section 4.2, this study is a QUAL-dominated design. Quantitative findings reveal the general trend, and qualitative findings help to understand and enrich this trend. This section presents the integrated findings to reveal a more complete picture.

9.3.1 The Relationship between Technology Use Frequency and Teachers' Perceptions of Technology, Perceived Affordances and Constraints, and Technology Use

Quantitative findings revealed that the frequency of technology use is associated with teachers' perceptions, perceived affordances, and constraints of technology, as well as their use of technology (see Sections 5.2.5, 5.3.3, 5.4.7, and 5.5.4). Teachers who used technology more frequently tended to perceive it as more useful and easier to use. They often exhibit more positive attitudes, greater confidence, and a stronger intention to use technology in the future. In addition, teachers who use technology more frequently agree more strongly with statements about technology's affordances, such as its ability to provide multimodal resources, motivate students, facilitate concentration, make classes more engaging, support collaborative learning, enhance classroom interactivity, improve student understanding, and boost academic performance. Furthermore, teachers who use technology more often are more likely to use diverse types of technology for teaching, collaborative learning, and providing feedback. These positive perceptions appeared to create a feedback loop, encouraging greater technology use.

In contrast, teachers who used technology less frequently perceived barriers such as limited access to technology, difficulties in adopting new tools, and time constraints during lessons.

These challenges might reinforce their reluctance to use technology, further reducing its frequency of use. Together, these findings highlight the dynamic relationship between the frequency of technology use and teachers' perceptions, where positive experiences appear to encourage adoption, while perceived constraints seem to hinder it.

Qualitative findings from classroom observations provide additional nuance to these patterns. While the qualitative findings did not include self-reported data on the frequency of technology use, observation data showed that all teachers employed technology during lessons, except when technical issues or exams occurred. However, frequent use of IWB and PPT was observed primarily for content delivery at Apple and Blueberry Schools (see Sections 9.2.3 and 9.2.4). This suggests that frequent technology use did not necessarily mean diverse or creative application of technology, which contrasts with the quantitative results which found higher frequency associated with varied technology use. Conversely, observations at Cherry School indicated that teachers employed a wider variety of technologies and incorporated more open-ended, student-centred activities (see Sections 9.2.2, 9.2.3, and 9.2.4), which aligns more closely with the quantitative findings. These contrasting patterns across schools demonstrate that the relationship between technology use frequency and how teachers used technology in teaching is more nuanced than the quantitative data alone might suggest, requiring consideration of school-specific factors.

9.3.2 Teachers' Attitudes towards the Role of Technology in Teaching

This section reports teachers' nuanced perceptions of technology, drawing on both survey and case study data. Teachers' perceptions of technology's advantages and disadvantages, their varied perceptions of its role in teaching, and the potential gap that may lie between their willingness and confidence in using it in their teaching are discussed.

Teachers across all data sources considered technology to have both advantages and disadvantages. Quantitative findings revealed that teachers perceived technology as useful

(see Section 5.2.2) with a variety of technology affordances like making learning more interesting (see Section 5.3.2), but they were less likely to agree with the statement that technology facilitates student concentration (see Section 5.3.2). This divergence was also reflected in the qualitative findings, where teachers commented on both the potential of technology to attract and sustain students' attention (see Sections 6.5, 7.5, and 8.5) and the risk of technology becoming a distraction if not used effectively (see Sections 6.4.1 and 7.4.1).

Teachers held different perceptions on the role of technology in teaching. The quantitative findings did not directly address this topic while the qualitative findings revealed diverse views. Some teachers primarily viewed technology as a delivery tool, viewing it as supplementary to their teaching (see Sections 6.4.2 and 7.4.2). Some teachers recognised that technology could be used to not only present content, but also to actively facilitate classroom interactions, as well as address specific pedagogical needs. For example, some teachers reported that they utilised Seewo IWB to engage students in peer assessment and co-generating content (see Section 7.4.2). Meanwhile, others regarded technology as a core component in their teaching (see Section 8.4.2).

Teachers expressed greater willingness to adopt technology than confidence in using it in specific ways in their teaching. Quantitative findings revealed that teachers held a positive attitude toward technology and a strong intention to use it in the future, while they reported slightly lower levels of technology self-efficacy and perceived ease of use in teaching (see Section 5.2.3). This finding was supported by qualitative data from the case study schools. All teachers expressed positive attitudes toward technology and valued its advantages (see Section 9.2.1), yet some teachers expressed that they were not so confident in using technology for teaching in class (see Section 9.2.3).

9.3.3 Technology Supports Teachers' Teaching

Teachers employed technology to support their teaching, with quantitative findings revealing broad agreement that technology made their job easier. The qualitative findings from Cherry School offer one specific perspective on what this “support” might entail in practice. Teachers there highlighted three key areas primarily related to their workflow: lesson preparation, addressing content-related questions during class, and improving teaching efficiency (see Section 8.9). It is important to note that while the broad survey data likely encompasses a wider range of interpretations of “support” (including student-focused aspects like motivation and engagement), the interviews at Cherry School provided a concrete look at how teachers perceive technology as a tool to make their job more manageable. In particular, regarding why they integrated technology to address student questions in class, two Cherry School teachers noted that they viewed the internet as a source of authoritative knowledge in this digital era (see Section 8.9).

Apart from teachers' perceptions of the role of technology in teaching, other factors like technology availability, teachers' technology skills, and technology self-efficacy also played a role. Together, these factors enabled the teachers utilise technology to enhance their teaching practice.

9.3.4 The Relationship Between Technology Use and Students' Academic Performance and Oral English Proficiency

The relationship between technology and students' academic performance and oral English proficiency was revealed by both quantitative and qualitative findings. The quantitative findings showed that while most teachers believed technology could help learning, they were less sure about its direct impact on students' academic performance (see Section 5.3.2). This aligns with the qualitative findings, where teachers in Apple and Blueberry Schools had mixed opinions about whether technology improved academic performance (see Section 9.2.6). Some teachers in Apple and Blueberry Schools said that when technology was used in

a specific way and carefully designed by them, like PPT highlighting key points, it could enhance teachers' teaching and help students perform better, while others stressed that individual effort and teaching methods mattered more with technology playing a minimal role (see Section 9.2.6). Similarly, teachers from both schools had mixed views on whether technology improved students' oral English proficiency. Some teachers believed that technology could improve students' oral fluency through approaches like multimedia presentations, while others stressed that oral fluency depended more on teacher instruction than technology (see Section 9.2.6).

From the findings, it appears that overall, teachers were less convinced that technology directly improved students' academic performance. Instead, they tended to believe that teacher instruction and teaching methods had a greater impact on enhancing both academic performance and oral proficiency. When teachers perceived technology as beneficial, it was typically because technology was used to enhance their teaching approaches, thereby indirectly supporting student outcomes. Given that teachers at Apple and Blueberry Schools faced term-based examinations, their views on the relationship between technology and academic performance, particularly that teaching had a greater impact on students' academic success than the use of technology, might influence their approaches to using technology in class. In contrast, Cherry School teachers did not specifically discuss this topic, reflecting different institutional goals and assessment contexts.

9.3.5 Technology Engages and Motivates Students

Teachers perceived technology as useful for making classes more interesting, engaging, and interactive, as well as for motivating students. Quantitative findings showed that teachers highly agreed with statements such as “technology affords multimodal features to support learning,” “using technology has increased students' learning motivation,” and “using technology makes English lessons more interactive,” indicating a strong consensus on technology's ability to create engaging learning environments (see Section 5.3.2). This

finding was echoed by qualitative findings. Teachers from the three case study schools employed multimodal elements to attract students' attention, engage students and make class more interesting. Game-based learning, technology-student interaction, technology-supported peer assessment, technology-supported TPR, and technology-mediated discussion were conducted to encourage student participation in class (see Section 9.2.2). Teachers also applied specific motivational strategies, such as incorporating entertainment elements, providing immediate feedback, and creating a sense of progress and accomplishment (see Section 9.2.2).

In addition, while the quantitative findings did not explore differences in teaching approaches in different contexts, qualitative findings showed that while Apple and Blueberry School teachers employed more structured, teacher-guided strategies, Cherry School teachers, who also adopted similar approaches, extended them by leveraging technology's potential to stimulate deeper learning and open-ended discussions among students (see Section 9.2.2). This difference might stem from a combination of factors, including teachers' willingness to adopt new tools, their perceptions of technology as more than a delivery tool in teaching, and access to varied digital tools in the classroom.

9.3.6 Technology Supports Student Collaborative Learning

Quantitative findings showed that teachers expressed relatively low level of agreement with the statements that technology supports student collaborative learning (see Section 5.3.2). Qualitative findings provided further insight into this. They revealed that while teachers perceived technology as useful and used it to support student collaborative learning, this did not equate to frequent collaborative learning. Teachers reflected that their use of technology to support collaborative learning constituted only a small part of their overall teaching practices. This supports the quantitative findings and indicates that teachers' lower agreement reflects the limited scope of collaborative learning practices rather than a rejection of technology's potential.

Quantitative findings revealed that public school teachers agreed more strongly than private school teachers that technology facilitates student collaborative learning. Qualitative findings provide further insights into this finding and showed that teachers at public schools (Apple and Blueberry Schools) and a private school (Cherry School) held different views on technology-supported collaborative learning (see Section 9.2.3). Apple and Blueberry School teachers broadly viewed activities like using technology to present assessment criteria as collaborative learning, while Cherry School teachers believed it required deeper integration, such as group projects with iPads. Public school teachers' tendency to view a wider range of activities as technology-supported collaborative learning, including when technology was used as a prompt. This broader conceptualisation may explain why public school teachers showed stronger agreement in the quantitative findings. Qualitative findings also showed that these differences may reflect variations in technology availability, school curriculum, teachers' technological skills, technology self-efficacy, and technological training. It should be noted that the survey included a limited number of private school teachers, and the case studies involved a small sample, which may constrain the generalisability of these findings.

Quantitative findings showed that teachers perceived using technology to manage student group work in class as not easy (see Section 5.2.3). However, this difficulty was not perceived uniformly across all teachers. Quantitative findings revealed that teachers with less teaching experience found it easier than more experienced teachers (see Section 5.2.4). The quantitative data further revealed a relationship between teachers' perceived difficulty in learning new technology and the amount of training they received (see Section 5.4.6). Relating to these findings, qualitative findings revealed that teachers who received recent training on current technology reported greater technological skills and higher technology self-efficacy, which supported them in teaching with technology (see Sections 6.10.1, 7.10.1, and 8.10.1).

Together, these findings suggest that while teaching experience was found to be related to teachers' self-reported ability to use technology for group management, this relationship tended to be mediated by the timing and recency of their technological training. This pattern may be attributed to the recency of their professional training; newer teachers are trained with current technologies, while the training of more experienced teachers may be less up-to-date or reflect earlier technological contexts.

9.3.7 Technology Supports Scaffolded Learning

Teachers recognised the value of technology in enhancing student learning and supporting scaffolding strategies. Quantitative findings revealed that teachers highly agreed with the role of technology in supporting student learning. Specifically, teachers strongly agreed that technology offers “multimodal features to support learning,” “makes English lessons more interactive,” and helps “students understand the learning content more easily” (see Section 5.3.2). Qualitative findings further focused on scaffolded learning, indicating that teachers across the three case schools perceived technology as useful for scaffolded learning (see Section 9.2.4). They implemented four common scaffolded learning strategies, which included using technology: 1) to make content visually clear; 2) to support context-embedded learning; 3) to activate prior learning to support new learning; and 4) to support formative assessment to enhance learning. Their rationale was that technology has the potential to make content, especially abstract ideas, visually clear, attract students' attention, provide context, activate prior knowledge, facilitate understanding, and enable students to interact with digital content (see Section 6.7, 7.7, and 8.7), which could help students learn better in class.

In addition, the qualitative findings revealed differences in how teachers at the three schools implemented scaffolded learning strategies in their teaching (see Sections 6.7, 7.7, and 8.7). Teachers at Apple and Blueberry Schools adopted more structured approaches, using technology primarily to deliver content and support their instruction (see Sections 6.7 and 7.7). In contrast, while Cherry School teachers also employed these structured approaches,

they extended their use of technology to facilitate more open-ended, student-centred activities, encouraging students to explore ideas and engage actively (see Section 8.7). This difference might stem from a combination of factors, including technology availability, exam pressure, and classroom time constraints (see Section 9.2.4).

Furthermore, quantitative findings showed that teachers may perceive technology as more useful for other instructional tasks than providing feedback. The qualitative data helps to explain and add depth to this finding. Qualitative analysis revealed that teachers used technology across a range of scaffolded learning strategies, with formative assessment being only one of several applications and therefore relatively less used. This suggests that teachers employ technology to support a broader range of learning strategies, such as content visualisation and contextual learning, than they do for providing feedback.

9.3.8 Technology Supports Student Skill Development

Teachers considered technology useful for supporting the development of students' skills. Quantitative findings indicated strong agreement that technology could improve students' language learning (see Section 5.2.2). This was consistent with qualitative findings, which revealed that teachers at all three schools focused on developing students' linguistic skills. Apple and Blueberry School teachers also fostered meta-cognitive awareness and student autonomy respectively to enhance students' language learning, whereas Cherry School teachers fostered a broader range of skills, including student autonomy, digital skills, research skills, and critical thinking (see Section 9.2.5). This might stem from curricular differences and varying exam pressures across the schools.

9.3.9 A Summary of Findings across Data Sources

Table 9.4 summarises the eight key findings that emerged from the integrated analysis of quantitative survey data and qualitative case study data. Each finding is supported by evidence from one or both data sources, demonstrating convergence or providing

complementary insights.

Table 9.4*Summary of Key Findings with Quantitative and Qualitative Evidence*

Corresponding section	Findings	Survey	Case studies
Section 8.3.1	The frequency of technology use was related to teachers' perceptions of technology and their way of using it.	√	High frequency but low diversity in technology application in Apple and Blueberry School
Section 8.3.2	Teachers held nuanced attitudes toward the role of technology in teaching.	1) Recognised technology's pros and cons 2) Greater willingness to adopt technology than confidence to use it in specific ways	1) Teachers from three schools recognised technology's pros and cons 2) Teachers from three schools held mixed perceptions of technology's role 3) Teachers from three schools expressed positive attitudes but some reported low technology self-efficacy
Section 8.3.3	Teachers used technology to support their teaching.	Agreed that technology made the teaching job easier	Cherry School teachers used technology to support lesson preparation, address content-related questions during class, and improve teaching efficiency.

Corresponding section	Findings	Survey	Case studies
Section 8.3.4	Teachers had mixed views on the relationship between technology and both students' academic performance and oral proficiency.	Perceived a positive impact of technology on learning but reported less certainty about the direct effect on performance.	Held mixed views on technology's impact on academic performance and English oral proficiency.
Section 8.3.5	Teachers used technology to engage and motivate students.	Perceived technology as useful for making classes more interesting, interactive, and motivating to students.	<ol style="list-style-type: none"> 1) Teachers across three schools used technology to engage and motivate students. 2) Teachers from three schools employed structured, teacher-guided technology use. 3) Cherry School teachers extended their practices to foster deeper learning and open-ended discussion. 4) The difference in approaches might have stemmed from a combination of factors.

Corresponding section	Findings	Survey	Case studies
Section 8.3.6	Teachers considered technology as useful for supporting collaborative learning.	<ol style="list-style-type: none"> 1) Reported lower agreement on technology for collaborative learning versus. general applications. 2) Public school teachers expressed stronger agreement on technology for collaborative learning, compared to private school teachers. 3) Newer teachers found using technology to manage students' group work easier than more experienced teachers did. 	<ol style="list-style-type: none"> 1) Teachers from three schools perceived technology as useful for supporting student collaborative learning 2) Technology use for collaborative learning constituted only a small part of overall teaching practices. 3) Public and private school teachers held different conceptualisations of technology-supported collaboration. 4) The difference in perceptions might have stemmed from a combination of factors.

Corresponding section	Findings	Survey	Case studies
Section 8.3.7	Teachers considered technology as useful for supporting scaffolded learning.	<ol style="list-style-type: none"> 1) Reported high agreement on technology's support for student understanding. 2) Reported less use of technology for feedback than for other activities. 	<ol style="list-style-type: none"> 1) Teachers from three schools perceived technology as useful for scaffolded learning. 2) Teachers from three schools employed structured, teacher-guided strategies with technology as a content delivery tool. 3) Cherry School teachers extended their practices to use technology to facilitate open-ended and student-centred approaches. 4) The difference in approaches might have stemmed from a combination of factors. 5) Teachers from three schools used technology less for feedback compared to other activities.

Corresponding section	Findings	Survey	Case studies
Section 8.3.8	Considered technology as useful for developing students' skills.	Highly agreed that technology could improve students' learning.	<ol style="list-style-type: none"> 1) Teachers from three schools focused on developing students' linguistic skills 2) Cherry School teachers cultivated a broader range of skills.

9.4 Chapter Summary

This chapter integrated data from all sources, presenting cross-case analysis findings first, followed by the merged quantitative and qualitative findings. In doing so, it synthesised insights on teacher perceptions, teachers' technology practices, and multi-level factors influencing use of technology, thus making explicitly connections to the theoretical frameworks used in this study (see Sections 3.2, 3.3, 3.4) and responding to the gaps outlined in the literature review (see Sections 2.2.4, 2.3.5). The cross-case analysis revealed that teachers across the three schools held different attitudes towards the role of technology in teaching. In addition, they consistently valued technology for engaging and motivating students, supporting collaborative and scaffolded learning, and fostering student skill development. Their approaches showed both similarities and differences across the schools. Additionally, public (Apple and Blueberry) and private school (Cherry) teachers held different conceptualisations of what constitutes technology-supported collaboration. Furthermore, teachers from Apple and Blueberry Schools presented mixed views regarding the relationship between technology and students' academic performance and oral English proficiency. Some noted that carefully designed technology use had a positive impact, while others emphasised that teachers' instruction remained more influential, with technology playing a minimal role. Finally, Cherry School teachers discussed how they used technology to help with their teaching, particularly in addressing content-related questions in real time during lessons.

The integrated findings added further nuances to the cross-case analysis findings. They showed that the variations in technology implementation across different school contexts tended to be shaped by multiple factors including technology availability, curriculum requirements, exam pressures, and teachers' training experiences. This aligns with the multi-level influences identified in literature review (see Section 2.4), while providing fresh evidence of context-specific barriers unique to Chinese primary schools. Apple and Blueberry Schools predominantly employed structured, teacher-guided approaches using routine tools primarily for language learning, while Cherry School teachers extended their use to more varied, student-centred approaches that fostered broader skills including linguistic skills, digital skills, research skills, and

critical thinking. These differences appeared to stem from varying institutional goals, assessment contexts, and access to diverse digital tools. Additionally, the relationship between teaching experience and technology use appeared to be mediated by the recency of technological training, with newer teachers often demonstrating greater confidence due to more recent training in current technologies, while experienced teachers may have lacked sufficient recent professional development in this area.

The integration of quantitative and qualitative findings also revealed a dynamic relationship between teachers' frequency of technology use and both their perceptions and their ways of using technology. The quantitative data showed that higher frequency of technology use is associated with more positive teacher attitudes, greater confidence, and more diverse applications, while less frequent use is related to perceived barriers like limited access and time constraints. However, qualitative data added nuances: frequent use of technology at Apple and Blueberry Schools often involved routine tools (e.g., IWB, PPT) for content delivery, whereas Cherry School teachers employed more varied, student-centred approaches, suggesting school contextual factors influence teachers' technology application beyond mere frequency.

Chapter 10 Discussion

10.1 Introduction

This chapter aims to discuss the key findings of this study in light of the existing literature and to highlight its contributions to the understanding of teachers' use of technology for teaching in EFL contexts. Drawing primarily on teachers' self-reported data from surveys and interviews, the chapter is structured into five main sections. The first section discusses teachers' reported frequency of technology use and how this frequency relates to their perceptions and use of technology in teaching. The second section explores how teachers use technology to engage students and support their learning. The third section examines how teachers use technology to support students' skill development. The fourth section illustrates how teachers enacted technological pedagogical knowledge in their teaching, contributing to the understanding of the TPACK model in the Chinese primary school EFL context. The fifth and final section presents two novel factors identified by this study as suggested extensions to the TAM and UTAUT models. The chapter ends with a brief summary of key points arising from the discussion.

10.2 Teachers' Frequency of Technology Use

This section contributes to answering all three research questions of this study, which explore teachers' perceptions and use of technology, as well as the factors that influence their use of technology. The survey findings of this study revealed a significant association between the self-reported frequency of technology use by primary school EFL teachers and their perceptions and use of technology. This section discusses this relationship in relation to relevant literature.

Focusing on the frequency of technology use for teaching is important because this provides an indication of the extent to which technology is used in classes. This also provides background for the subsequent discussion of the specific use of technology by teachers (see Sections 10.3 and 10.4). As there is a paucity of research on the frequency of technology use and how this influences teachers' perception and pedagogical use of technology in EFL contexts, the findings of this study help to

address this gap and enhance our understanding of these relationships, providing insights into the application of technology in EFL classrooms.

10.2.1 Technology Use Frequency and Teachers' Perceptions

The survey in this study found that primary school EFL teachers who reported higher use of technology tended to perceive it as more useful and easier to use. They also reported more positive attitudes, greater confidence, and stronger intentions to use it in the future. In addition, teachers who used technology more often were more likely to perceive its affordances. These affordances include providing multimodal resources, motivating students, facilitating concentration, making classes more interesting and interactive, supporting collaborative learning, improving student understanding, and boosting academic performance. These positive perceptions may, in turn, encourage greater technology use. This relationship indicates a positive association between teachers' frequency of technology use and their perceptions of it, though the causal direction of this relationship requires further investigation.

Much of the existing literature on teachers' use of technology has focused on adoption decisions, implementation approaches, and influencing factors. Studies have examined whether teachers decide to adopt technology, how they use it (ranging from simple, routine tasks to more complex and innovative pedagogical approaches), and the factors that influence their adoption and use. For example, Ertmer et al. (2012) examined how in-service teachers' beliefs influence their decisions to adopt technology, while Teo (2012) explored six factors affecting pre-service teachers' technology integration. However, there has been limited research investigating the frequency of technology use by teachers. The findings of the current study contribute to filling this gap by connecting teachers' self-reported frequency of technology use with their perceptions and self-reported technology practices.

The finding that frequent technology use is associated with more positive perceptions aligns with the work of Pynoo et al. (2012). Their study examined teachers' use of an educational portal outside the classroom. They found that more frequent portal users tended to find it more useful and easier to use. These users also held more positive attitudes towards technology, felt more confident in their ability to use it effectively,

and expressed stronger intentions to continue using it. Consistent with the current study's finding of a significant association between frequency and perceptions, Pynoo et al. (2012) also suggest that these positive perceptions, in turn, promote greater technology use.

While Pynoo et al.'s (2012) study involved teachers (N=919) from various educational levels with a non-classroom focus, and measured technology use through actual system logs, the current study provides insights from primary school EFL teachers (N=244) about their classroom context, relying on self-reported usage frequency. Despite these contextual differences and the methodological distinction in how frequency was measured, the consistency in the core finding that frequent use is associated with positive perceptions is noteworthy. Understanding this relationship is useful because it suggests that interventions aimed at increasing either usage frequency (e.g., through accessible training and robust support) or improving perceptions (e.g., by clearly demonstrating benefits and successes) may initiate a positive cycle, leading to more effective and sustained technology integration. Therefore, this study adds to the literature by highlighting the role of the *frequency of technology use* by teachers in this under-researched area, suggesting this relationship may be a key component in the complex process of technology integration. Further research, however, is still needed to examine this relationship in more detail.

The finding that frequent technology use correlates with teachers' perceptions of its affordances, rather than just positive perceptions about technology more broadly, is further supported by the work of Inan and Lowther (2010). Inan and Lowther (2010) found that K-12 teachers' perceptions of technology's overall benefits were associated with its increased use in class. While Inan and Lowther (2010) explored overall benefits of technology, this current study investigated its specific affordances, such as its use to make classes more interesting and interactive, thereby complementing their findings by offering a more granular perspective. Similarly, Hue and Jalil (2013) found that university teachers' perceptions of specific affordances of technology (e.g., collaborative learning support) correlated with the frequency of its use in class. Despite the different contexts of primary school EFL classrooms in this study, higher education in Hue and Jalil (2013), and K-12 settings in Inan and Lowther (2010), the

consistent findings suggest that teachers' perceived affordances of technology are associated with the frequency of technology use in class.

Additionally, the finding of the relationship between perceived affordances and higher frequency of technology use aligns with research by Li et al. (2019), which indicates that Chinese primary school EFL teachers who feel more confident in using new tools integrate technology more frequently in classroom instruction. This may be because frequent technology use increases teachers' familiarity and proficiency with technology, thereby reducing their perceived difficulties in adopting new tools, while infrequent use may exacerbate such challenges, as those who feel unready or lack confidence may be less likely to use technology.

Conversely, the survey findings of this study revealed that primary school EFL teachers who used technology less frequently were more likely to perceive barriers, such as limited access to technology, difficulties in adopting new tools, and time constraints during lessons, compared to those who used technology more frequently. These perceived challenges might reinforce their reluctance to use technology, which may further discourage technology use. These findings align with Li and Ni (2011), who surveyed 120 primary school EFL teachers in China and found that lack of hardware access hindered teachers' frequent use of technology.

Furthermore, the finding that time constraints during lessons are associated with lower technology use aligns with Becker (2000) who found that primary and secondary school teachers with longer class periods (e.g., 90–130 minutes) reported more frequent technology use compared to those with traditional 50-minute classes, suggesting that time availability facilitates greater technology use. Likewise, Bai et al. (2021) found that insufficient time within class periods, combined with other facilitating conditions like resource availability, restricted Hong Kong primary school EFL teachers' ability to integrate technology effectively.

Given the limited exploration of this specific relationship in prior literature, this study helps to shed light on this gap and enhances our understanding of the association between teachers' perceptions and their self-reported frequency of technology use.

These findings collectively indicate that while frequent use is associated with positive perceptions of affordances, infrequent use appears linked to greater reporting of constraints and barriers. Ultimately, this study offers a more nuanced perspective on how teachers perceive the complex process of technology integration in educational settings like primary school EFL classrooms, thereby contributing to the existing literature.

10.2.2 Frequency of Technology Use and Diversity of Technology Use

The survey in this study showed that primary school EFL teachers who used technology more often were more likely to employ diverse types of technology for teaching, collaborative learning, and providing feedback. This diverse use of technology might also create a feedback loop, encouraging greater technology use. This finding is supported by research across various educational contexts. For instance, studies involving university teachers (García et al., 2015), vocational teachers (Akuner et al., 2012), and teachers' use of educational portals outside the class (Pynoo et al., 2012), all demonstrate a relationship between higher frequency of technology use and more diverse and active pedagogical applications.

Conversely, contexts with infrequent technology use, such as the Ecuadorian primary schools studied by Gaviria et al. (2015), show correspondingly limited diversity in tool use (predominantly YouTube). This suggests that a certain threshold of regular, consistent use of technology might be a prerequisite for teachers to feel comfortable enough to experiment with diverse technological applications and integrate them more deeply into their teaching. Without this sustained engagement, technology use may remain superficial and limited in scope. Therefore, the current study and the three aforementioned studies collectively suggest a relationship between the frequency of teachers' technology use and the diversity of their pedagogical applications.

The qualitative case studies offered a more nuanced perspective on the relationship between the frequency and diversity of technology use revealed by quantitative data. While teachers across all three case study schools (Apple, Blueberry, and Cherry) frequently used technology in class, a divergence emerged in the types of technology employed and their pedagogical application. Specifically, teachers at Apple and

Blueberry Schools (both public schools) employed PPT and IWB primarily for content delivery, whereas teachers at Cherry School (a private school) used a wider variety of technologies and incorporated more open-ended, student-centred activities in class.

This divergence in technology use patterns appears to stem from a constellation of interconnected contextual factors including the availability and nature of technological resources, the influence of curriculum requirements and assessment pressures, and teachers' perceptions of the role of technology in teaching. The first factor was availability and nature of technological resources. Apple and Blueberry Schools operated under the unified management of the district education bureau, which provided their technology equipment, mainly comprising PPT, (Seewo) IWBs, and projectors (see Sections 6.2 and 7.2). In contrast, Cherry School, as a private, self-funded school, had invested in a more diverse range of digital equipment, which included iPads, an e-library system, an Airplay application as well as IWBs and PPTs (see Section 8.2). This difference in breadth, flexibility and student-centred nature of the available technologies likely influenced teachers' diverse pedagogical approaches. Cherry School's wider range of technology tools afforded teachers greater opportunities for designing more student-centred activities, compared to the more presentation-oriented and standardised resources in the public schools. This observation aligns with research emphasising that beyond mere physical access, it is the variety and quality of resources that critically shape the diversity and innovation of technology integration (e.g., Drijvers, 2015). Furthermore, the provision of student-centred tools and rich digital content, as evidenced at Cherry School, is well-documented to foster more active learning environments and support a broader spectrum of pedagogical strategies (e.g., Zucker & Light, 2009; Tay, 2016).

The second factor shaping this divergent technology use across case schools concerned curriculum requirements and assessment pressures. At Apple and Blueberry schools, the national curriculum and term-based assessments created pressure for teachers to cover knowledge points in class. This focus led teachers to favour tools that are easy to control and convenient for whole-class learning, such as PPTs and IWBs. This observation aligns with research showing that highly standardised, exam-

driven systems often constrain pedagogical innovation and limit technology's role primarily to an efficient tool for existing practices (e.g., Means et al., 2003; Au, 2011). In contrast, Cherry School utilised both a national standardised curriculum and an international curriculum, coupled with multidimensional assessments for students, creating a much broader set of pedagogical goals. This environment, alongside the availability of technology, enabled teachers to employ a wide array of technologies to achieve these diverse goals. This is consistent with studies demonstrating that more flexible learning environments and assessment methods foster more student-centred technology use (e.g., Hussain & Al Saadi, 2019; Arifatin, 2023).

The influence of teachers' pedagogical goals on the frequency and variety of technology use is further supported by Tay et al. (2012). Their research revealed that EFL teachers with more student-centred pedagogical goals (e.g., fostering reflective writing) demonstrated more frequent and varied use of technology. This contrasted with mathematics teachers in the same study, whose technology use, though frequent for specific goals like skill reinforcement, was less varied and associated with fewer student-centred strategies. This comparison reveals that it is not just the quantity of use (frequency) but also the quality and purposefulness of that use that likely contributes to more diverse technology-supported teaching. This insight helps explain the differences in technology-mediated pedagogical practices across the schools. The practices at Apple and Blueberry were more focused on content delivery, in contrast to the wider variety of practices including more student-centred strategies at Cherry School.

The third factor was teachers' perceptions of the role of technology in teaching, and these perceptions varied significantly across the schools. At Apple and Blueberry School, teachers mainly viewed technology as a delivery tool, secondary to their primary teaching methods. In contrast, teachers at Cherry School consistently viewed technology as not only a delivery tool but a necessary and core component of their instruction. This difference in perception, whether technology is seen as an optional add-on or an integral element that could support various approaches, appears to be a key factor underpinning the distinct ways teachers across the three schools use technology.

While existing literature examines teachers' beliefs about technology and pedagogy, less attention has been given to how these beliefs shape teachers' perceptions of technology's role in teaching practice. This study explores how teachers' perceptions vary across three classroom settings, reflecting their views on technology's utility. For example, teachers at Cherry School viewed technology as a core component, using iPads for group projects to foster collaboration and student-centred learning. Such findings align with research by Niess (2005), which suggests that teachers' views on the role of technology shape their practices. Similarly, Hammond and Manfra (2009) and Tondeur et al. (2017) indicate that teachers' pedagogical priorities shape how they perceive and use technology. Therefore, teachers' perceptions of the role of technology appear to guide their technology integration practices in their unique classroom contexts.

A fourth factor that may have contributed to the differences in technology use was the variation in English class time allocation across the schools. Cherry School provided more English instruction time and had slightly smaller class sizes compared to Apple and Blueberry Schools (see Sections 6.2, 7.2 and 8.2). This difference may have provided Cherry School teachers with greater opportunities to experiment with diverse technologies and implement more student-centred activities. The additional time likely reduced the pressure to rush through curriculum content, allowing teachers to explore more interactive and technology-enhanced pedagogical approaches (see Section 8.10.1). In contrast, the more limited class time at Apple and Blueberry Schools may have reinforced teachers' preference for efficient use of technology (see Sections 6.10.1 and 7.10.1). This time constraint aligns with the earlier discussion in Section 10.2.1 and research showing that insufficient class time can limit teachers' willingness to integrate innovative technologies that require longer setup or implementation periods (e.g., Bai et al., 2021; Singh, 2018).

Collectively, the findings reveal a nuanced relationship between technology use frequency and diversity. While the survey data suggest a positive relationship (consistent with Akuner et al., 2012), the qualitative findings demonstrate that frequent use does not automatically lead to more varied applications (Li & Ni, 2011;

Zhao & Frank, 2003), as contextual factors such as resource availability, curriculum constraints, and teachers' perceptions significantly influence implementation.

The qualitative insights offer a more nuanced perspective on the survey's findings, revealing a pattern that appears consistent with what could be conceptualised as a threshold effect. For the purposes of this study, the term threshold effect is used to suggest that there may be a critical level of technology use frequency below which teachers struggle to develop diverse ways of using technology in their teaching. The findings indicate that EFL teachers operating below this threshold seem to find that reaching a sufficient frequency of use is a prerequisite to exploring diverse technological applications, as without regular engagement, they may lack the necessary experiential basis. For teachers who appear to have surpassed this frequency threshold, however, frequency alone ceases to be the determining factor. Their practice is instead influenced by other contextual barriers, such as the availability of resources and curriculum pressures, making diversity of use a goal that is not automatically achieved. Therefore, while this study cannot definitively establish a threshold effect, the findings are consistent with such a pattern and suggest this concept merits further investigation as an important component in understanding the complex relationship between frequency and diversity of technology use.

This contribution offers important insights into teacher professional development. It suggests that efforts to enhance technology integration should place greater emphasis on fostering regular and sustained technology engagement. Only then can professional development programs gradually and strategically address wider contextual barriers to help teachers foster truly varied and meaningful pedagogical applications.

10.3 Technology Engages Students and Supports Learning

This section discusses how teachers in this study utilised everyday technology to support student learning, thereby directly addressing RQ2, which focuses on teachers' use of technology and their rationales. The discussion unfolds in two parts. First, it will examine how technology was used to engage and motivate students, a practice where this study's findings both confirm and challenge existing literature on classroom interaction. Second, the section will detail the specific strategies through

which teachers employed technology to provide scaffolded learning, addressing a gap in the literature on technology in primary school EFL classrooms.

10.3.1 Technology Engages and Motivates Students

The findings of the survey and case studies converge to suggest that teachers perceived technology as useful for engaging and motivating students, as well as for supporting their learning. The survey showed that teachers strongly agreed that technology affords multimodal features to support learning, increases students' motivation, makes lessons more interactive, and facilitates students' understanding. These perceptions are consistent with prior research (e.g., Laurillard, 2013; Clark & Mayer, 2023).

The findings of the case studies elaborated on the survey results, showing that teachers employed multimodal elements and technology-supported interactive activities such as digital games, peer assessment, and TPR to attract students' attention, make lessons more interesting, encourage students' participation, and motivate students. The effectiveness of these approaches in the classroom is supported by a body of research. For instance, literature demonstrates that interactive and multimodal technologies, such as IWBs and digital games, are effective in making learning more fun and attentive, thereby boosting student motivation (e.g., Duran & Cruz, 2011; Öz, 2014; Bado & Franklin, 2014; Balbay & Erkan, 2018). Furthermore, research also supports the use of technology to enhance specific pedagogical strategies, like digital tools for formative assessment and technology-assisted TPR, which have been shown to motivate active participation and foster classroom interaction, especially with younger learners (e.g., Licorish et al., 2018; Balaskas et al., 2023; Shruthi et al., 2024).

While the role of technology in fostering multimodal teaching (Jewitt, 2012) and creating interactive classrooms (Gee, 2003; Kress, 2009) is well-established in international research, this study adds particular insights into how these principles are applied within Chinese primary school EFL classrooms, an area which has not received much attention in the research literature.

Although the finding from the case studies that teachers considered technology useful for engaging and encouraging student participation aligns with the findings of many studies, this finding also contrasts with research that highlights limitations in IWB use for fostering student interaction (e.g., Higgins et al., 2007; Glover & Miller, 2001; Schmid, 2010). For example, Schmid (2010) found that when a teacher invited students to interact with the IWB, the one at a time nature of these activities meant that other students had to sit and wait for their turn, which caused some students to lose concentration and interest.

This discrepancy between Schmid (2010) and this study's findings, where Schmid found that IWB activities reduced student concentration while this study's teachers reported increased engagement, may stem from the participating teachers in this study strategically designing more inclusive activities. This highlights that effective technology integration is not merely the functional use of technology, but a deliberate pedagogical orchestration that ensures learner engagement. For example, in similar situations, the teachers of this study assigned the role of peer assessors to the students while they were waiting for their turn. Another explanation may be attributed to the participating teachers' broader perceptions of what constitutes "active" or "interactive" learning. The teachers in this study valued cognitive engagement activities, such as peer assessment, alongside physical interaction with the IWB. This broader conception of interaction led them to adopt more inclusive pedagogical strategies. Consequently, they reported more positive outcomes regarding student engagement in their classrooms. Nevertheless, these strategies may not fully address the engagement challenges Schmid (2010) identified, as some limitations of IWB use may persist despite these alternative pedagogical approaches.

While research such as Schmid (2010) advocated appropriate management of IWBs to ensure broader student involvement, this study demonstrates how specific, teacher-led pedagogical designs, like assignment of roles, could transform potentially disengaging moments into valuable learning opportunities and help to mitigate the limitations of IWBs. Ultimately, this study highlights the pivotal role of teacher-led pedagogical design, offering a more nuanced perspective on managing interactive technologies in real-world primary school EFL classrooms.

10.3.2 Technology Scaffolds Student Learning

The findings of this study reveal a strong consensus among primary school EFL teachers regarding the value of technology to scaffold student learning. They employed technology to scaffold student learning through various strategies, which included: a) enhancing visual clarity and emphasis for effective learning; b) supporting context-embedded learning; c) activating prior learning to support new learning; and d) utilising technology for formative assessment.

For the first strategy, consistent with established research, teachers in this study frequently utilised everyday technology to enhance visual clarity and emphasise key learning content. For example, their use of technological features or tools to emphasise key points aligns with research such as Whyte et al. (2014), who found EFL teachers used technology to direct students' attention and emphasise items, thereby supporting students' learning. Similarly, their use of technology to make the content visually clear to students is consistent with research such as Baz (2016), who highlighted that PPT can make abstract concepts more tangible and understandable to students through its features of visualisation.

For the second strategy, teachers in this study achieved context-embedded learning by pairing intuitive images with new knowledge points and constructing real-life scenarios for language practice. This finding aligns with research indicating that technology, employed by teachers, provides rich, meaningful and real-life scenarios for students' language learning, thereby clarifying complex concepts and supporting communication tasks (e.g., Sari, 2024; Gan, 2025). In some instances, it even offers situational experiences and understanding (Chang et al., 2020).

For the third strategy, the teachers used song videos, audio and images to activate students' background knowledge, thereby supporting them in learning the new content. The teachers also used technology to review the previously learned content, thereby building a foundation for new concepts. Such pedagogical uses of technology are substantially corroborated by research, which highlights the effectiveness of authentic multimedia in connecting current and new knowledge (e.g., Beliaeva, 2023; Clare, 2017), and the usefulness of technology-aided review for establishing a robust

foundation for future learning (Pham, 2023).

Finally, for the fourth strategy, teachers in this study utilised technology to support various facets of formative assessment. This included leveraging digital tools to present criteria to support formative peer assessment, provide automatic feedback, and make student work visible (e.g., via IWBs or projectors) for public display, thereby facilitating peer, teacher, and whole-class assessment and discussion. These diverse applications of technology to enrich formative assessment processes, thereby promoting student learning and understanding, are well-documented in existing research (e.g., Widodo & Chakim, 2023; Kireeti et al., 2024; Potok & Spjut, 2023; Liu, 2024; Samsonova, 2018).

These findings, when synthesised, further refine what constitutes effective technology integration in primary school EFL classrooms: it is not the sophistication of the technology per se. Rather, it is the teacher's deliberate pedagogical design decisions (as discussed in Section 10.3.1) that transform everyday tools into effective scaffolded support for learning. One concrete, empirically grounded example of best practice identified in this study is Ning's (Cherry School) approach to context-embedded learning (Section 8.7.2). Ning created immersive experiences using everyday tools. He turned off the lights and projected related visuals onto the ceiling, allowing students to "stargaze" while learning the content; for the textbook "Language in Action" dialogues, he connected his phone to the Seewo IWB, left the room, and called a student who then answered in front of the class. Such teacher-orchestrated technology integration not only embeds language in realistic contexts but also highlights that effective scaffolding relies primarily on pedagogical design rather than advanced technological features.

Therefore, these findings contribute to the literature on teachers' use of technology to scaffold and support learning in primary school EFL contexts. Existing research predominantly investigates this area in online, blended, or experimental settings and primarily at the tertiary level. Such studies often focus on students using advanced technology with built-in scaffolding designs such as automated feedback or guided learning pathways to improve outcomes such as language skills and autonomy (e.g.,

Hsieh, 2017; Arancón et al., 2012; Zou & Xie, 2019). While many studies of primary school EFL classrooms do describe the use of technology to support student learning, they rarely frame these pedagogical practices as using technology to scaffold student learning. This reveals two gaps in the literature: a) a lack of focused research on scaffolding within primary school EFL settings, and b) a lack of clear articulation of the teacher-led pedagogical strategies in these contexts as a form of scaffolding.

These two gaps are particularly evident in contexts such as Chinese primary public schools, where teachers often rely on standard tools provided by local educational authorities, which usually lack the embedded scaffolding designs found in more sophisticated, advanced technologies. In these settings, how teachers provide scaffolding with technology depends heavily on their own pedagogical applications of simple tools, rather than on the intrinsic features of the technology itself. Therefore, the current study contributes to addressing these gaps by identifying and offering insights into specific pedagogical strategies through which primary school EFL teachers utilise everyday technologies to scaffold students' learning. In doing so, this study brings these often-unarticulated approaches to the forefront and makes a valuable contribution to the literature on scaffolding in language education.

10.4 Technology Supports Student Skill Development

This section addresses RQs 2 and 3, which explore how teachers use technology for teaching, their rationales and the factors that influence their teaching. A key finding that directly relates to these research questions is that teachers in the case schools utilised technology to foster a range of student skills, encompassing linguistic competencies as well as critical thinking, meta-awareness, research skills, technological skills, and student autonomy. Two main aspects of this finding will be discussed: firstly, the spectrum of student skills cultivated across the different schools; and secondly, the multifaceted contextual factors that appeared to influence the schools' educational goals for skill development.

10.4.1 Student Skills Fostered via Technology

The findings of the case studies reveal that teachers considered technology useful for

enhancing students' linguistic skills, specifically encompassing their abilities in listening, speaking, reading, and writing, a view widely supported across diverse educational contexts and consistent with existing literature on technology-mediated language acquisition (e.g., Chapelle, 2005; Blake, 2013; Grgurović et al., 2013). They used technology to deliver rich language input for listening and reading, to give students chances to practise speaking in real-life situations, to scaffold them in planning and organising their ideas before writing, and to provide on-the-spot corrections and explanations after they wrote.

However, beyond linguistic skills, this study also found an emphasis on developing student autonomy at Blueberry school. A few teachers who are newer to their profession and with more recent training in current technologies employed technology to create a more student-centred classroom to foster student autonomy. These teachers commonly utilised the affordances of technology to provide students greater control over their learning processes. This approach is supported by studies demonstrating how strategically integrated digital tools can enhance learner autonomy within student-centred environments (e.g., Kencana, 2025; Alrabai, 2021).

Cherry School teachers, additionally, fostered a broader range of skills, including student autonomy, digital skills, research skills, and critical thinking. The development of such broader competencies through technology aligns with calls in the literature for fostering 21st-century skills (e.g., Shadiev & Wang, 2022). In addition to utilising technology to promote student autonomy, like newer teachers at Blueberry School, teachers here also fostered students' digital skills by designing learning activities that required hands-on interaction with technology. Such practices find support in the literature (e.g., Couse & Chen, 2010). Furthermore, students' research skills were fostered by using technology to search for information. This approach is consistent with studies highlighting technology's role in supporting student research (e.g., Kuhlthau, 2010; Brooks, 2015). Finally, Ke from Cherry School utilised technology to cultivate students' critical thinking by, for example, utilising online materials to provoke students' deeper thinking and discussion. This aligns with literature on technology's potential to foster higher-order thinking (e.g., Bağ & Gürsoy, 2021; Algouzi et al., 2023).

While extensive research has established the potential of technology to foster student competencies such as linguistic skills, autonomy, digital skills, and critical thinking (e.g., Grgurović et al., 2013; Alrabai, 2021; Algouzi et al., 2023), this study provides particular insights into how these skills were cultivated through specific pedagogical practices within the Chinese primary school EFL contexts.

10.4.2 Contextual Influences on Skill Development

Having outlined the diverse ways technology was used to support student skill development across the case schools; this section explores the distinct institutional contexts that appear to contribute to these variations. As was evident in the discussion on the frequency of technology use, curriculum and assessment methods play a significant role (see Section 10.2.2). In the context of skill development, these two aspects affect the scope and focus of teachers' use of technology to cultivate student skills. At Cherry School, teachers perceived that fewer curriculum and assessment constraints provided them with the flexibility to foster students' broader skill development. The school's dual curriculum and multidimensional assessments (see Section 8.2) supported teachers in using technology in a wider range of ways for broader educational goals. In contrast, teachers in Apple and Blueberry Schools, bound by the national standardised curriculum, faced greater exam pressures, and, in turn, limited their technological integration for broader skill development. These contextual differences align with research identifying restrictive curricula and high-stakes testing as barriers to pedagogical innovation and 21st-century skill development (e.g., Rubin & Kazanjian, 2011; Allehaby, 2024). Conversely, studies suggest that curricular autonomy and diverse assessment systems empower teachers to leverage technology more creatively for skill development (e.g., Chiu, 2022).

The differing availability and nature of technological resources, previously discussed in Section 10.2.1, also emerged as a factor influencing the potential for broader student skill development. Cherry School's sophisticated tools, compared to those at Apple and Blueberry Schools, supported more diverse pedagogical practices for skill development. This aligns with existing literature noting that the availability of advanced technological resources is a key factor in facilitating diverse pedagogical

practices to foster student skills (e.g., Amaniampong & Hartmann, 2023; Merovci & Dimov, 2024). However, this study suggests that institutional context played a stronger role in how technology was used within this study's setting. Apple and Blueberry Schools' context, constrained by the implementation of standardised curricula and high-stakes testing pressures, as well as the administrators' attitudes towards the role of technology in teaching, appeared to restrict teachers' use of technology for 21st-century skills. Such constraints likely restrict broader applications of technology, even with greater resource availability. In such environments, advanced technology might still be primarily used for exam preparation. Thus, while technology access enables innovation, this study highlights that its impact may still be limited by institutional constraints, particularly curriculum and assessment demands, a concern also echoed in the work of Dede (2010).

Moreover, the findings of this study revealed that teachers' agency, attitudes, and their technological skills are crucial determinants of how technology is integrated to foster student learning. This perspective is well-supported by existing literature (e.g., Zhang 2023; Contuk et al., 2024). However, this study suggests that these teacher-level factors are likely influenced by overarching institutional context, particularly curriculum and examination pressures. It is possible that in highly constrained institutional environments, such as those characterising Apple and Blueberry Schools, factors like curriculum rigidity and examination pressures might act as dominant forces, potentially overriding or significantly shaping how individual teachers' technological skills, agency, and attitudes translate into practice. Conversely, the more flexible environment at Cherry School likely offered greater latitude for such teacher-level factors to influence technology integration more broadly. This suggests that an enabling institutional context may be crucial for allowing teachers to leverage technology effectively in fostering a broader range of student skills. Therefore, while fully recognising the importance of teacher agency, attitudes, and technological skills documented in the literature (e.g., Zhang, 2023; Contuk et al., 2024), this study contributes to this body of research (e.g., Dede, 2010; Rubin & Kazanjian, 2011; Allehaby, 2024) by providing a more comprehensive understanding of the dynamics of multi-level factors that influence teachers' technology use and highlighting the potential primacy of the institutional context in creating the conditions necessary for

these attributes to flourish in the Chinese primary school EFL setting.

10.5 Contributions to TPACK

This section addresses RQ2, which concerns how Chinese primary school EFL teachers use technology. In doing so, it contributes to the TPACK literature by offering a more in-depth understanding of how teachers' technological pedagogical knowledge (TPK) is enacted in Chinese primary school EFL classrooms.

This study's qualitative findings illuminate how primary school EFL teachers enact TPK within the TPACK framework, revealing diverse approaches to technology integration. Teachers across the three case schools applied TPK to engage students and scaffold their learning. For example, they used the multimodal features of Interactive Whiteboards (IWBs) to capture attention and to design gamified tasks to enhance motivation. Such actions demonstrated technological pedagogical knowledge (TPK) as an effective integration of technology and pedagogy for effective learning experiences (Koehler & Mishra, 2009).

Variations in enactment emerged across schools. At Apple and Blueberry Schools, while teachers drew upon their TPK, technology often functioned as a delivery tool to support their pedagogical goal. This aligns with literature noting technology's role in enhancing traditional pedagogical methods (Harris et al., 2010). In contrast, teachers at Cherry School demonstrated a type of TPK where technology and pedagogy were more deeply intertwined and mutually influential, such as teaching a reading text by browsing a related website together. This reflects a closer interplay of technological and pedagogical knowledge, enabling new pedagogical designs, consistent with research supporting technology's role in expanding pedagogical possibilities (Voogt et al., 2013).

These findings thus offer nuanced TPK enactments across the three schools in the Chinese primary school EFL setting. Voogt et al. (2013) noted a scarcity of research on TPACK in specific subject domains. Ye et al. (2024) further emphasised the limited focus on domain-specific TPACK in English language teacher education. This study, thus, contributes to the existing literature by providing nuanced insights into teachers'

enactment of TPK within the specific context of the Chinese primary school EFL classrooms, an area where subject-specific and context-specific TPACK research is still developing.

10.6 Contributions to TAM and UTAUT Framework

This section addresses the third research question by exploring the factors that influence teachers' use of technology in teaching. It further suggests contributions to the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) (see Sections 3.3 and 3.4) by identifying two novel factors: 1) Teacher Autonomy within their schools (TAws) and 2) the interaction between teaching experience and training recency. Within TAM, factors influencing teachers' technology use are typically categorised as external variables impacting perceived usefulness (PU) and perceived ease of use (PEOU), rather than defined as distinct constructs (Davis, 1989). Similarly, UTAUT tends to embed such factors within broader constructs like social influence and facilitating conditions (Venkatesh et al., 2003). Numerous empirical studies have complemented these models by exploring various influences. For instance, Anderson and Dexter (2005) highlighted the role of school technology leadership, and Inan and Lowther (2010) revealed the importance of dedicated technology support. However, some nuanced factors arising from the day-to-day realities of teaching remain underexplored. This section explores two such factors identified in this study. It then discusses their theoretical and practical implications to provide a more granular understanding of technology adoption and use in educational settings.

10.6.1 Teacher Autonomy within Their Schools

Teacher autonomy within their schools (TAws), as proposed by this current study, refers to teachers' perception of their freedom to select appropriate technology tools, flexibility to adapt technology according to their teaching approaches, and capacity to determine the specific ways in which technology is used in their practice. Crucially, even when the adoption of technology is prescribed, teachers may still exercise varying degrees of autonomy, as this autonomy is expressed through the choices they make when implementing and using the technology in their classrooms.

This study's qualitative findings highlighted the crucial role of TAWs in teachers' practices with technology, showing that TAWs could influence teachers' perceived usefulness of technology in their teaching. This shows that teachers from public and private schools experienced different levels of autonomy regarding their use of technology in classrooms. As mentioned in Sections 6.2 and 7.2, Apple and Blueberry School as public schools follow a nationally standardised curriculum, adopt national textbooks, and conduct term-based exams. This created pressure for teachers to prioritise curriculum content over innovative methods. Specifically, a few teachers reported that some student-centred and innovative teaching methods involving technology were too time-consuming (see Sections 6.10 and 7.10).

In addition, the provision of technology for public schools was centrally managed by the district education bureau (see Sections 6.2 and 7.2). This uniformity restricted teachers' access to more diverse digital tools and, as teachers reported, limited their opportunities to integrate alternative technologies, to implement more student-centred approaches that could be supported by these tools (see Sections 6.10 and 7.10). Consequently, teachers were unable to recognise their broader pedagogical usefulness.

Furthermore, professional training sessions for public schools, organised centrally by the district education bureau (see Section 6.2 and 7.2), further constrained TAWs. These sessions focused primarily on pedagogical training, with limited technological training provided (see Sections 6.10 and 7.10). During the pedagogical training sessions, technology was primarily used as a delivery tool for presenting material (see Sections 6.10 and 7.10), which in turn shaped teachers' own perceptions and practices of using technology. In summary, the combined pressures of a high-stakes curriculum, limited technological resources, and limited professional training created a restrictive environment where teachers' autonomy to innovate with technology was systematically constrained, which in turn influenced teachers' perceptions of the usefulness of technology.

In contrast, in Cherry School (private school), TAWs was enhanced through independent curriculum design, assessment methods, technology provision, and professional training. The school adopted a dual curriculum, incorporating both

international and national standards. Its assessment methods were multidimensional, including social practices and competitions (see Section 8.2). In this context, teachers reported that they viewed technology as useful for broader pedagogical goals beyond linguistic knowledge, such as cultivating students' digital skills (see Section 8.8). In addition, being self-funded, Cherry School independently procured its own classroom technology, providing a range of equipment, such as iPads and laptops (see Section 8.2). With these different technologies, teachers reported that they were able to implement more creative pedagogical activities (see Section 8.7), which enhanced their appreciation of technology's pedagogical potential. Furthermore, the school organised its own training sessions, which invited educational experts to share their research findings about advanced teaching approaches in which the role of technology was elevated beyond that of a simple delivery tool (see Section 8.2). This enhanced teachers' perception of technology's usefulness and inspired them to experiment with a wide range of digital tools, rather than adhere to a single, prescribed method. In summary, the combined curriculum, technological resources, and professional training created a flexible environment where teachers' autonomy to innovate with technology was less constrained, which in turn influenced teachers' perceptions of the usefulness of technology.

Therefore, TAwS in this study appeared to directly influence teachers' perceived usefulness of technology (PU in TAM) and their expectation that it would improve their performance (PE in UTAUT). This observation is consistent with Self-Determination Theory, which suggests that when individuals are empowered to select and modify tools according to their specific requirements, they tend to form more positive perspectives of those tools (e.g., Schneider et al., 2018).

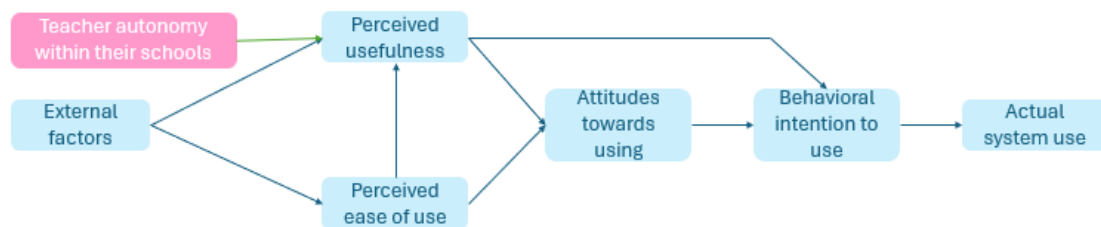
Accordingly, within the TAM model, this study introduces TAwS as an antecedent variable that directly influences perceived usefulness (PU), as shown in Figure 10.1. This indicates that TAwS influences teachers' perceived usefulness of technology, which indirectly shapes their attitudes and intention to use technology, ultimately affecting actual use. TAwS belongs to the general external factors (from the original TAM). Here, to highlight its central role and the empirical findings, Figure 10.1 depicts TAwS as an independent construct influencing teachers' perceived usefulness

of technology (PU). At the same time, the model also retains the established influence of other general external factors, such as training, on both perceived usefulness (PU) and perceived ease of use (PEOU), as well as other key pathways from the original model. Thus, TAWs, as a newly introduced factor, operates alongside these established elements to form an extended TAM model.

It is worth noting that TAWs may potentially influence other constructs such as perceived ease of use (PEOU), as teachers might apply their autonomy to select tools that are simpler to operate or more familiar to them. However, the qualitative findings of this study most clearly and directly supported the impact of TAWs on perceived usefulness (PU) in the TAM, whereas evidence to support these other influence pathways was less clear. Therefore, this study focuses on the empirically supported pathway from TAWs to perceived usefulness (PU), while potential links to other constructs are not included in the current model.

Figure 10.1

An Extended TAM Model Proposed in This Study

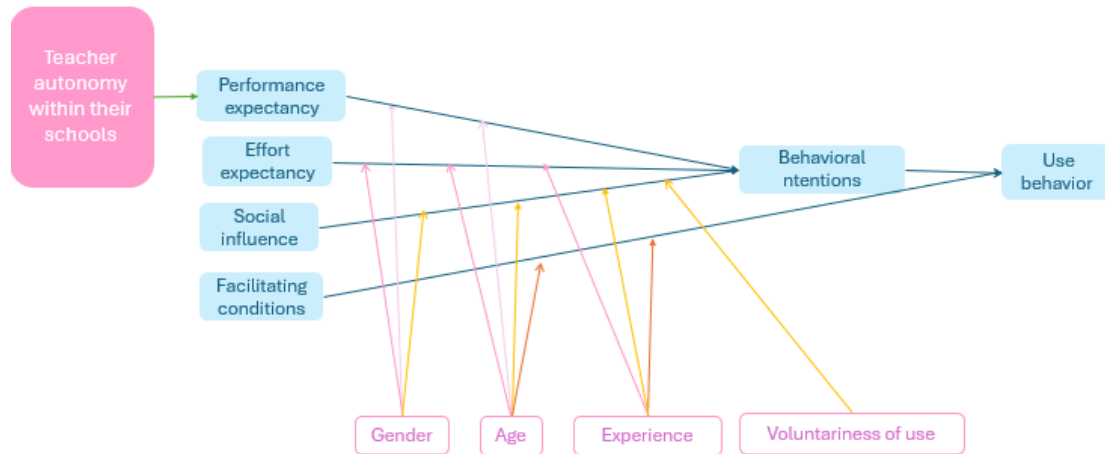


Similarly, within the UTAUT model, the study introduces TAWs as an antecedent variable that directly influences performance expectancy (PE) (conceptually similar to perceived usefulness in TAM), as shown in Figure 10.2. As discussed earlier, TAWs affects teachers' expectations of how technology could help improve their teaching practice. This, in turn, influences teachers' intention to use technology, ultimately impacting technology use. Concurrently, the extended model also incorporates the established core determinants from the original UTAUT framework. Specifically, performance expectancy (PE), effort expectancy (EE), and social influence (SI) work as key predictors of teachers' behavioural intention (BI) to use the technology. Furthermore, behavioural intention (BI), along with facilitating conditions (FC), subsequently influences its actual use. Gender, age, experience, and voluntariness of

Use are four moderators. Thus, TAWs, as a newly introduced factor, operates alongside these established elements to form an extended UTAUT model.

Figure 10.2

An Extended UTAUT Model Proposed in This Study



While TAWs may potentially influence other constructs in UTAUT such as effort expectancy (EE) as teachers can use their autonomy to choose technologies that require less effort to learn and use. However, the qualitative findings of this study most clearly and directly supported the impact of TAWs on performance expectancy (PE) in the UTAUT model, whereas evidence to support these other influence pathways was less clear. Consequently, the current model emphasises this well-supported connection rather than including speculative pathways.

To clarify the specific contribution of TAWs within the proposed TAM and UTAUT models, it is helpful to differentiate it from several external factors identified in the models. In TAM, unlike technological infrastructure or training (e.g., Ertmer, 1999; Darling-Hammond et al., 2017), TAWs emphasises teachers’ proactive decision-making capacity rather than reliance on institutional resources. In contrast to teacher beliefs or technology self-efficacy (e.g., Zhao & Frank, 2003; Compeau & Higgins, 1995), TAWs is not an attitude or confidence but rather refers to the perceived latitude and discretion afforded to teachers within their school environment to make autonomous choices about their technology use.

In terms of UTAUT, facilitating conditions (FC) is typically defined as “the degree to

which an individual believes that an organisational and technical infrastructure exists to support use of the system” (Venkatesh et al., 2003, p. 453). Thus, facilitating conditions (FC) generally pertains to the perceived availability of objective resources, technical support, or infrastructure that might enable technology use. TAWs, in contrast, as noted above, refers to the perceived latitude and discretion afforded to teachers within their school environment to make autonomous choices about their technology use. Hence, facilitating conditions (FC) and TAWs have different focuses, and the presence of facilitating conditions (FC) does not necessarily guarantee that teachers experience autonomy (TAWs).

Furthermore, TAWs offers a conceptually broader understanding of autonomy compared to voluntariness of use (VoU) within the UTAUT model. Voluntariness of use (VoU) typically captures the dichotomous nature of use (voluntary versus mandatory) and may not fully encompass the spectrum of autonomy teachers experience. Indeed, Kittinger and Law (2024) noted its frequent omission or partial application in empirical studies exploring teachers’ technology adoption, suggesting its limitations in the educational field. However, voluntariness of use (VoU) acts as a moderating variable, often on the social influence (SI) on behavioural intention (BI) path (Venkatesh et al., 2003), which explains how contextual voluntariness alters susceptibility to social pressure. In contrast, TAWs is conceptualised as an antecedent directly influencing performance expectancy (PE). Therefore, due to these differences in functional positioning and mechanism, TAWs is introduced in this study as a new, independent factor, rather than as a direct replacement for voluntariness of use (VoU). Future research could further explore how a broader teacher autonomy construct like TAWs might be reconceptualised in future model iterations to potentially encompass both direct influences and moderating roles, or how these two facets of autonomy might be more precisely integrated.

These distinctions underscore the novelty of TAWs and raise questions about its absence in the original frameworks. TAWs is not a factor in the original TAM and UTAUT frameworks. This may be because TAM and UTAUT models are tested quantitatively and rely on predefined constructs (Davis, 1989; Venkatesh et al., 2003). Autonomy itself as a multifaceted, context-dependent concept, is not easy to capture

by a quantitative approach (Ryan & Deci, 2000; Deci & Ryan, 2008). Rather, a qualitative approach is more likely to reveal such nuanced topics as teacher autonomy within their schools through the voice of teachers directly (Lincoln & Guba, 1985).

This absence of teacher autonomy as a distinct factor is not limited to models but is also evident in empirical research. While several qualitative studies (e.g., Kim et al., 2013; Li, 2014) have captured aspects of teacher autonomy within schools, this factor has typically been subsumed within broader categories and presented implicitly. For instance, Kim et al. (2013) investigated how teachers' beliefs about teaching and learning shaped their technology use choices. Consequently, data related to teacher autonomy in Kim et al.'s (2013) study were embedded within the broader topic of teacher beliefs and their connection to teaching practices. This current study, however, highlights teacher autonomy within schools as a distinct factor influencing technology integration.

In summary, this study's qualitative findings identify and incorporate TAWs as a distinct factor when adapting TAM and UTAUT for educational settings. While existing models like TAM and UTAUT provide foundational frameworks for understanding technology acceptance, the findings of this study suggest that identifying TAWs as a separate factor can further enrich these models in educational contexts. This approach therefore offers a more nuanced understanding of the specific influences shaping educational technology adoption, particularly in systems with rigid curricula that may distinctively shape or limit autonomy.

10.6.2 Teaching Experience and the Recency of Training

The interaction between the teachers' experience and their recency of their training is an important yet underexplored factor influencing their adoption and use of technology. Interview data from this study have captured this interaction. Teachers newer to the profession appear to have an advantage due to their more recent training experience and greater familiarity with current technologies. For example, such teachers at Apple School attributed their perceived ease of using PPT and IWBs to their familiarity with these tools from their school days. Similarly, such teachers at Blueberry School reported that the courses on technology use they received during

their university programs supported their use of technology in teaching.

In contrast, the more experienced teachers in this study felt that their lack of recent training impeded their use of technology in teaching. They felt they encountered a disconnect, as previously mastered tools became obsolete at a certain point, and they needed to learn new technologies from scratch. This situation was a source of frustration, with the teachers feeling they had lagged in technological advancements.

Therefore, the perceived difference between teacher groups suggests that accumulated teaching experience alone, without continuous updating of technological skills, is insufficient for the smooth adoption and use of new technologies. The findings thus suggest that an interaction between teachers' experience and recent training influences their technology use.

However, empirical studies have largely overlooked this interaction, treating experience and training as two separate factors, or using age as a simple proxy for teaching experience. Existing research presents a mixed view: some studies identify teaching experience as an important factor in teachers' technology use (e.g., Rabbianty et al., 2024; Petko et al., 2018), while others find limited influence (e.g., Chai et al., 2013; Erdin & Uzun, 2022). For instance, Rabbianty et al. (2024) reported that teachers newer to the profession demonstrated greater use of varied technologies and higher technology self-efficacy, attributing this to their more recent familiarity and engagement with current technology tools. This result aligns with the findings of the current study, which similarly identified advantages for newer teachers benefiting from their recent training and familiarity with technology. Conversely, Erdin and Uzun (2022) found no significant relationship between the duration of teaching experience and perceived technology proficiency. They thought effective in-service training programs equip experienced teachers with updated technological skills, thereby addressing potential disadvantages of longer teaching careers. Their point about the benefits of updated training for experienced teachers corresponds with this study's finding that more experienced teachers perceived their lack of recent training as a significant impediment.

Traditionally, discrepancies in findings on experience and technology use have often been attributed to varying contextual factors across different studies (Scherer et al., 2018). For instance, meta-analyses suggest that whether the participants are pre-service or in-service teachers, the specific type of technology being examined, and the national context of the study can all moderate the relationship between experience and technology use (Scherer et al., 2018).

However, this study indicates that the observed inconsistencies may not solely arise from contextual differences or from the isolated effect of age or teaching experience itself. Instead, they might be better understood as a result of the interaction between a teacher's years of teaching experience and the recency of their training on current technologies. Viewing through the lens of a potential interaction, the aforementioned empirical findings may not be contradictory, as the influence of a teacher's years of experience on technology adoption is not fixed but is significantly moderated by the timeliness of their technology training. Their pedagogical experience could be undermined by outdated technological skills or, conversely, amplified by current and relevant training. Therefore, this study proposes an alternative, or perhaps complementary, explanation for the contradictory findings in literature.

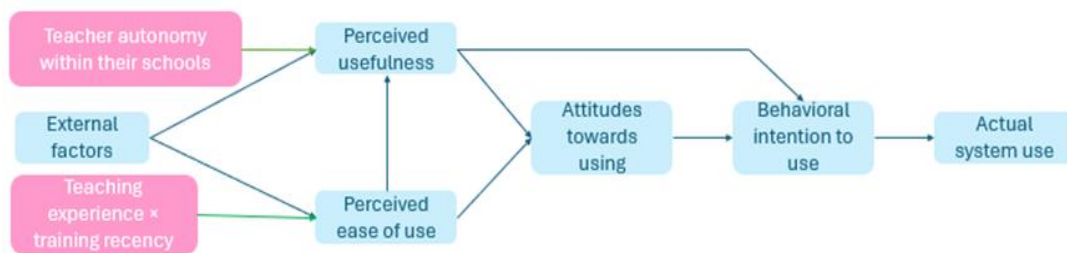
The findings of the study also revealed how the interaction impacted teachers' technology use. Specifically, the interaction in this study appeared to directly influence teachers' perceived ease of use of technology (PEOU in TAM) and their expected effort (EE in UTAUT). The findings indicated that teachers newer to the profession, typically due to their familiarity with current technologies gained from recent education or training, generally demonstrated higher perceived ease of use (PEOU) and lower effort expectancy (EE). In contrast, for the more experienced teachers, the disconnect between their early technology training and current mainstream technologies lowered their perceived ease of use (PEOU) and increased their effort expectancy (EE), because mastering and effectively applying these tools posed challenges to them. This detailed mechanism provides the empirical foundation for proposing the model extensions detailed below.

Accordingly, within the TAM model, this study introduces the interaction between

teaching experience and training recency as an antecedent variable that directly influences teachers' perceived ease of use (PEOU), as shown in Figure 10.3. This indicates that this interaction influences teachers' perceived ease of use of technology, which in turn influences their attitudes and intentions. The interaction belongs to the general external factors (from the original TAM). Here, to highlight its central role and the empirical findings, the model diagram depicts it as an independent construct influencing teachers' perceived ease of use (PEOU). At the same time, the model also retains the established elements from the original model. Thus, the interaction, as a newly introduced factor, complements the established determinant to form an extended TAM model.

Figure 10.3

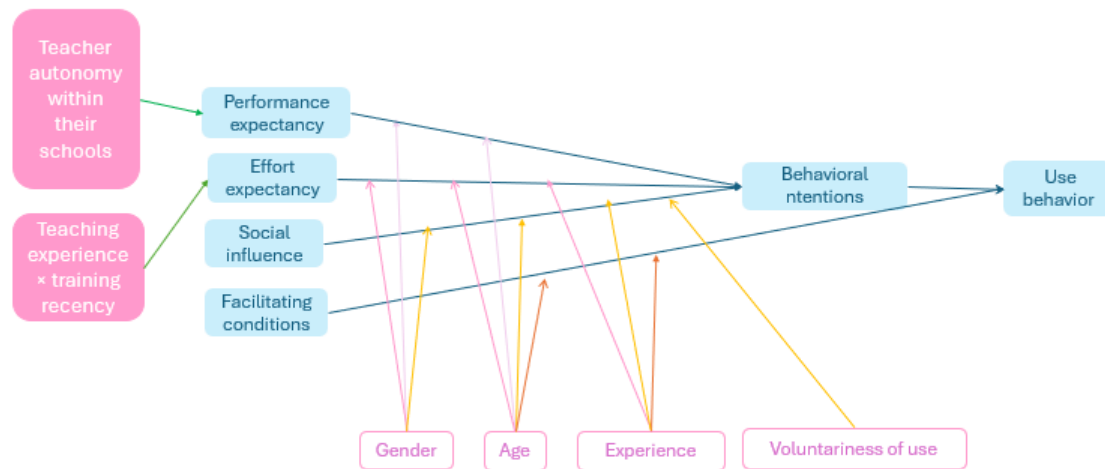
An Extended TAM Model Proposed in This Study



Similarly, within the UTAUT model, this interaction variable was found to directly influence effort expectancy (EE), as shown in Figure 10.4. This indicates that it affects teachers' expectation that the technology is easy to use. This, in turn, influences teachers' intention to use technology, ultimately impacting their actual use of it. Concurrently, the extended model incorporates core determinants from the original UTAUT framework, including performance expectancy (PE), effort expectancy (EE), and moderators such as gender and age. Thus, the interaction, as a newly introduced factor, complements the established determinant to form an extended UTAUT model.

Figure 10.4

An Extended UTAUT Model Proposed in This Study



As the preceding discussion has shown, beyond the influence of TAWs on perceived usefulness, the interaction between teaching experience and training recency also shapes teachers’ practices. This interaction operates in a complementary manner, primarily influencing constructs related to ease of use. Specifically, the findings provide strong empirical support for this interaction as a direct antecedent to perceived ease of use (PEOU) in the TAM model and effort expectancy (EE) in the UTAUT model.

In addition, the influence of this interaction appears to extend indirectly to teachers’ perceived usefulness (PU) within the TAM framework. According to the established principles of TAM, perceived ease of use (PEOU) influences perceived usefulness (PU). Since this study has already established that the interaction between experience and training recency directly influences perceived ease of use (PEOU), it logically follows that it will also shape perceived usefulness (PU) through this mediating path.

Regarding the UTAUT model, it is possible that this interaction could also potentially influence performance expectancy (PE). One might reason that teachers who received more recent training on current technology may enhance their technological skills, allowing them to accomplish teaching tasks more efficiently and effectively, thus leading them to expect that technology improves their teaching performance. However, this connection is considered less direct and certain compared to the pathway within TAM. Performance expectancy (PE) is a complex construct

influenced by numerous factors beyond user skill (e.g., technology's alignment with curriculum, its inherent capabilities). Therefore, while a potential link exists, it warrants further exploration in future studies.

Furthermore, this interaction may also relate to the moderators in UTAUT, given that teachers' teaching experience may correlate with their technology use experience and age. However, in this study, the evidence for these influences was less clear.

Therefore, this study limits its focus to these empirically supported relationships, suggesting that the broader, more complex interrelationships between this interaction and other variables merit future investigation.

To clarify its specific contribution, the interaction between teaching experience and training recency is conceptualised not as a general belief (like technology self-efficacy), an external resource (like facilitating conditions (FC)), or a demographic (like age or experience of using technology). Rather, it represents a foundational and dynamic construct: an internalised synergy shaped by a teacher's specific professional history of pedagogical practice and recent, relevant technology training. This focus offers a deeper understanding of how the interplay between a teacher's professional background and ongoing development influences their engagement with the current technologies. This study thus contributes to the TAM and UTAUT models by identifying the interaction between teaching experience and recency of training as a distinct antecedent for technology adoption.

In conclusion, this study treats TAWs and the interaction between teaching experience and training recency as independent external variables in the proposed TAM and UTAUT models. This decision is empirically grounded, as the data analysis revealed no significant relationship or qualitative association between these two factors in this study. By treating them as separate constructs, this study enables a more nuanced understanding of their distinct roles in shaping teachers' technology adoption and use in the Chinese primary school EFL context. Future research could continue exploring their relationship.

10.7 Chapter Summary

In this discussion chapter, the key findings of the study have been examined in light of relevant literature, underscoring its multifaceted contributions to understanding technology use in primary school EFL contexts.

To begin with, the study contributed to the literature by demonstrating a relationship between teachers' technology use frequency and their perceptions and use of technology, an area that remains underexplored. A key aspect of this relationship, particularly that between technology use frequency and variety, indicates that there is a critical point, which this study has labelled as a threshold effect, in teachers' technology integration. Specifically, the data suggested that while teachers' frequent use of technology is a necessary starting point for varied technology use, the specific institutional context also impacts the diversity of their technology use in class, explicitly addressing the gap between perceptions and implementation highlighted in prior studies.

The chapter then illuminated how teachers utilised everyday technology to engage, motivate and support students' learning. The discussion indicated that teachers' thoughtful lesson design and activity structuring helped to mitigate the limitations associated with technology tools. The discussion also brought to the forefront several specific, under-researched pedagogical strategies that primary school EFL teachers use to scaffold student learning with everyday technologies, thereby bridging the identified gaps in the literature and offering insights for primary school EFL teachers.

Furthermore, the study indicated that the institutional context is the primary factor determining the breadth of student skill development fostered by technology. The findings demonstrated that while teacher-level factors like agency are important, their impact is largely enabled or constrained by the overarching institutional climate, highlighting the primacy of an enabling context for pedagogical innovation.

Moreover, this study contributed to the TPACK literature by offering a rich, context-specific understanding of how teachers' technological pedagogical knowledge (TPK) was enacted in Chinese primary school EFL classrooms. Additionally, it contributed

to the TAM and UTAUT models and our understanding of teachers' technology adoption and use by identifying two novel, context-specific factors. These were "Teacher Autonomy within Their Schools" (TAws) and the interaction between teachers' teaching experience and the recency of training, providing critical extensions to the frameworks reviewed in Sections 3.2, 3.3, and 3.4.

Chapter 11 Conclusions

11.1. Introduction

This chapter, which concludes the thesis, first summarises the key findings that address the three research questions. It then discusses the implications for theory, methodology, and practice. Limitations of the study are also acknowledged, and recommendations for future research are provided. The chapter concludes with the researcher's reflections and the insights gained throughout this research journey.

11.2. Responding to the Research Questions

This study investigated Chinese primary school EFL teachers' perceptions of using technology in their teaching as well as their reported practices and the factors influencing these practices. This study was guided by three major research questions. The findings addressing each question are presented in this section.

RQ1: What are the perceptions of Chinese primary school EFL teachers on the use of technology in their teaching practice?

RQ2: How do Chinese primary school EFL teachers use technology in their planning and practice, and what is the rationale behind the choices they make?

RQ3: What do Chinese primary school EFL teachers see as the factors that support or impede their use of technology in their teaching practice?

11.2.1. Teachers' Perceptions of Technology in Teaching

This study revealed that Chinese primary school EFL teachers hold complex and multi-faceted perceptions regarding the role of digital technology in their teaching practice. The participating teachers generally reported positive attitudes toward technology and frequently utilised it in their teaching. They identified both advantages and disadvantages of its use in the classroom. They recognised how they could use technology to find a wider variety of teaching materials beyond the textbook, such as videos and websites, and to connect their lessons to a real-world context. They also recognised that they could enhance student engagement by using the multimodal and interactive features of technology. Yet they also expressed concerns about potential pedagogical drawbacks, including that technology could be distracting and reduce

classroom interaction if not used properly, as well as concerns about student well-being issues such as eyestrain.

Additionally, teachers exhibited diverse views on the role of technology in the classroom. Some primarily regarded it as a supplementary delivery tool, using it for activities such as displaying videos, accessing online resources, or projecting materials, while others saw its potential to go beyond mere delivery, serving as a supportive instrument for enhancing interactions and meeting varied instructional needs, such as supporting students to generate content together in class. By contrast, a smaller group of teachers considered technology a core component of their teaching approach.

11.2.2. Teachers' Use of Technology in Teaching and Their Rationales

This study revealed that Chinese primary school EFL teachers used a range of digital technologies, such as PPT, IWB, and the internet, in their teaching. Their rationales for doing so were multifaceted, primarily aiming to engage and motivate students, support student interaction and group work, support scaffolded learning, and facilitate student skill development.

Teachers across the three schools utilised multimodal elements (e.g., videos, audio, and images) to capture student attention and make learning more interesting. In particular, game-based activities were perceived to be an effective strategy to foster active student participation. Furthermore, teachers whose classrooms were equipped with Seewo IWBs also employed them to facilitate student-technology interaction, transforming students from passive observers into active participants. Moreover, teachers from Blueberry and Cherry Schools employed technology, particularly gamified elements, to motivate students, transforming learning tasks into enjoyable challenges.

Teachers also consistently used technology to support scaffolded learning strategies. They specifically utilised technology to make content visually clear, support context-embedded learning, activate prior knowledge, and facilitate formative assessment. The rationale teachers provided for this application was technology's potential to

make abstract concepts more intuitive, provide relevant context, aid comprehension, and allow students to interact with digital content more effectively.

Furthermore, teachers across the three schools used technology for what they considered collaborative learning activities. Apple and Blueberry School teachers utilised technology to support students' group work, such as "role-play" activities and conducting information gathering surveys, helping them practice target language structures with peers of different ability levels. Beyond group work, teachers at both schools also used PPT slides to display assessment criteria. They broadly viewed the use of technology to present information that facilitated classroom activities as collaborative learning. In contrast, Cherry School teachers believed collaborative learning required deeper technology integration, where students actively used iPads to create projects with group members and participated in team-based competitive digital games.

Finally, teachers across the three schools used technology primarily to support students' linguistic skills. Cherry School teachers supported a broader range of skills, including student autonomy, digital literacy, research skills, and critical thinking.

11.2.3. The Factors that Influence Teachers' Use of Technology in Teaching

The study revealed a multifaceted array of teacher-level, school-level, and system-level factors that collectively shaped Chinese primary school EFL teachers' technology use in teaching. At the individual teacher level, key supporting factors included teachers' willingness to adopt technology, their technological skills, and their self-efficacy in using these digital technologies. Notably, teachers with higher confidence and those who demonstrated greater agency in self-directed learning were more inclined towards innovative technology integration. The findings also highlighted that experienced teachers with less recent training faced greater challenges in using technology for teaching than teachers newer to the profession who had received more recent training.

Regarding school-level factors, several elements emerged as crucial to teachers' adoption and use of technology. On the positive side, the availability of technology

and supportive technical support provided a foundational base for teachers' technology use. Similarly, a positive school administration attitude towards technology served as a strong enabler for teachers' adoption of new technology and experimentation with innovative approaches. Teacher collaboration within the school environment proved particularly valuable across all schools, serving as a powerful mechanism for sharing resources and experiences.

However, several challenges persisted. Aging equipment and unexpected technical problems during lessons could disrupt teaching and discourage technology use when there are no technical support resources available. Additionally, the training was often seen as insufficient; teachers reported that the technological training sessions were too infrequent, and the content of pedagogical training where technology was mainly used as a delivery tool was insufficient to help them use technology in more diverse and creative ways.

Finally, system-level influences played a dual role. National educational policies and initiatives promoting technology use for teaching served as a positive driver for some teachers in incorporating digital tools into their teaching practices by advocating for technology integration, expanding infrastructure, and providing enriched online teaching resources. In contrast, policies aimed at reducing student academic burden and protecting eyesight consistently restricted public school teachers' technology use, especially for homework assignments. Additionally, external factors such as school curriculum requirements and examination pressure could limit the extent of teachers' innovative technology use.

11.3. Theoretical Implications

This study enriches the Technological Pedagogical Content Knowledge (TPACK) framework and extends Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT). The key contributions are outlined below.

11.3.1 Contributions to TPACK

This study makes contributions to the TPACK framework by providing empirical evidence of how technological pedagogical knowledge (TPK) is enacted in practice within Chinese primary school EFL contexts. This study found that while teachers across the three case schools utilised their TPK to engage students and scaffold learning, there were significant variations in its enactment. At Apple and Blueberry Schools, technology often functioned primarily as a delivery tool to support teachers' pedagogical goals. In contrast, teachers at Cherry School demonstrated a type of TPK where technology and pedagogy were more closely intertwined and mutually influential, supporting teaching approaches and even expanding pedagogical possibilities. Thus, this study contributes to the literature by providing empirical insights into how TPK is enacted within the Chinese primary school EFL context, addressing the limited research on domain specific and context specific TPACK (Voogt et al., 2013; Ye et al., 2024).

11.3.2 Contributions to TAM and UTAUT

This study extends TAM and UTAUT by identifying two novel factors that influence teachers' technology use, namely Teacher Autonomy within their Schools (TAws), and the interaction between teaching experience and training recency. In terms of TAws, existing models and empirical research tend to embed aspects of autonomy within broader factors. The identification of this novel factor enriches TAM and UTAUT models in educational contexts by offering a more nuanced understanding of the specific factors shaping educational technology adoption, particularly in contexts with rigid curricula that may distinctively constrain or limit autonomy.

This study also found that the interaction between teaching experience and training recency influences teachers' use of technology. This finding suggests the influence of a teacher's years of experience on technology adoption is moderated by the timeliness and relevance of their technological training. It challenges the existing approaches that treat teaching experience and technology training as separate factors. By identifying this interaction as a standalone factor, this finding enriches TAM and UTAUT models in educational contexts and offers a more comprehensive explanation

for previously contradictory findings in the literature regarding the role of experience in technology adoption.

By introducing and detailing these two factors through qualitative inquiry, this study provides a richer, more nuanced understanding of the specific factors influencing teachers' educational technology adoption and sustained use, moving beyond predefined quantitative constructs to capture the complexities of real teaching contexts.

11.4. Contribution to Literature

This study makes several contributions to the existing body of knowledge regarding technology use in primary school EFL education. These contributions include revealing the relationship between teachers' frequency of technology use and both their perceptions and use of technology, identifying several scaffolded learning strategies that teachers adopted using everyday technologies, and demonstrating how multiple contextual factors interact to shape teachers' technology use in Chinese primary school EFL classrooms.

11.4.1 Understanding Technology Use Frequency and Its Relationships

While there is limited research on the frequency of technology use in EFL contexts, this study helps to address this gap by revealing significant associations between frequency of technology use, teacher perceptions, and their diverse use of technology. The findings show that frequent technology users tend to develop more positive perceptions of technology and its affordances and are more likely to employ diverse technological applications, while infrequent users tend to perceive constraints and barriers of using technology.

More significantly, the study suggests what can be termed a threshold effect, which is a critical level of technology use frequency that serves as a prerequisite for teachers to adopt diverse applications. Regular engagement with technology could build the necessary experiential foundation for pedagogical innovation. However, for teachers who have surpassed this frequency threshold, frequency alone ceases to be the determining factor; instead, contextual factors become the primary influence on the

diversity of their technology use practices. This finding thus provides new insights into the complex relationship between frequency and diversity of technology use in educational settings and contributes to our understanding of the complex process of technology integration in the classroom.

11.4.2 Technology-Mediated Scaffolding in Primary School EFL Contexts

This study addresses a gap in literature by articulating specific scaffolding strategies that teachers adopt using everyday technologies (e.g., PPT and IWB) in primary school EFL classrooms in China. While much of the existing research focuses on advanced technologies with embedded scaffolding features such as automated feedback, particularly in higher education and online settings, this study makes visible the often-unarticulated, teacher-led strategies used in primary school EFL contexts. These strategies include using technology to enhance visual clarity, facilitate context-embedded learning, activate prior knowledge, and support formative assessment. These findings contribute a rich, practice-based understanding to the literature on scaffolding in primary level language education.

11.4.3 Contextual Factors in Technology Use in EFL contexts

This study provides nuanced insights into how multiple contextual factors interact to shape teachers' technology use in Chinese primary school EFL classrooms. By examining three schools with varying institutional contexts, the research reveals how factors such as resource availability, curriculum implementation, and assessment methods collectively influence not just whether teachers adopt technology, but how they use it. In particular, the institutional context plays a stronger role in how technology is used within this study's setting. The findings reveal that these systemic forces could significantly restrict or enable pedagogical innovation, at times even overriding individual teachers' skills or positive attitudes. This study thus highlights the primacy of institutional context in creating conditions necessary for effective technology integration in EFL contexts, contributing to the understanding of the complex interplay between institutional constraints and pedagogical innovation in language education.

11.5. Methodological Implications

This study employed a qualitative-dominant mixed-methods approach (quan+QUAL), combining survey data with multiple case studies through semi-structured interviews and classroom observations. This methodology, by addressing several limitations in existing TPACK research, contributes to this field, particularly concerning methods for investigating and understanding teachers' enacted knowledge in authentic classroom settings.

Understanding teachers' enacted technological pedagogical content knowledge presents ongoing methodological challenges for researchers (Voogt et al., 2013). While self-reported questionnaires have been widely used in TPACK research (Schmidt et al., 2009; Chai et al., 2013), their general statements make it difficult to distinguish between knowledge domains (Shinas et al., 2013). Analysis of instructional artifacts such as lesson plans (Harris et al., 2010; Stinken-Rösner et al., 2023) is limited by static materials that cannot capture dynamic knowledge enactment. Design-based research approaches (Angeli & Valanides, 2009) focus on interventions rather than everyday practices and may not reveal how individual teachers naturally enact their knowledge in authentic classrooms.

The qualitative-dominant design addresses these limitations by enabling deeper exploration of how and why teachers enact their knowledge. This approach allows for a more precise understanding of different knowledge domains through interviews while capturing teachers' actual practices through classroom observations. The integration of multiple data sources reveals nuances that single-method approaches might overlook. Particularly in the Chinese EFL context, this methodology allowed exploration of how cultural, institutional, and individual factors influence teachers' technology use, contributing to a more comprehensive understanding of TPACK enactment in non-Western educational settings.

11.6. Practical Recommendations

This study's findings offer several practical recommendations for various stakeholders involved in the integration of technology into Chinese primary school EFL teaching.

11.6.1 For Primary School EFL Teachers

This study suggests that thoughtfully designing learning tasks can offer a way for teachers to move beyond activities where students participate sequentially, one at a time, to transform potentially passive and disengaged moments into inclusive, cognitively engaging experiences for their students. Therefore, this study encourages teachers to view themselves as pedagogical designers who can creatively overcome the inherent limitations of technology for more effective teaching.

Additionally, this research brings to the forefront the value of everyday pedagogical practices. Teachers can be more intentional in their pedagogical decision-making by recognising that their use of available technologies to enhance visual clarity, provide context, or activate prior knowledge represents effective technology-supported scaffolding strategies. Formally acknowledging these actions can help validate and refine their professional practice, empowering them to be more reflective and purposeful in their technology integration efforts.

11.6.2 For Teacher Educators and Professional Development Providers

This study offers significant insights for teacher educators and professional development providers. The findings suggest that teacher professional development programs can promote teachers' technology use from two angles: a) clearly demonstrating specific, relevant affordances to teachers, and b) encouraging teachers to use technology more frequently. By showing teachers how technology can help and fit with their teaching, professional development programs can enhance teachers' positive perceptions of technology, which in turn motivates more frequent use.

This study also found that a certain level of regular, consistent use may be a prerequisite for teachers' pedagogical diversification. Therefore, the initial goal of

professional development should be to help teachers build confidence in using everyday technologies to foster their regular and sustained technology engagement.

Furthermore, this study highlights the critical interaction between teaching experience and training recency. The finding that experienced teachers felt impeded by outdated technological skills, while newer teachers benefited from their recent training, points to the necessity of continuous professional learning. This implies a need for differentiated professional development pathways: experienced teachers may require regular updates on new technologies to complement their pedagogical knowledge, whereas newer teachers might need more support in integrating their technological skills with effective pedagogical strategies. Importantly, professional development providers should ensure that such opportunities are accessible and inclusive for all teachers, particularly those over 45 who may face additional barriers to technology training or may be excluded from participating in technology-focused initiatives, as was found in Blueberry School in this study.

11.6.3 For School Leadership and Administration

This study reveals that teacher autonomy within schools plays a role in teachers' technology use for teaching. This study, therefore, suggests that all schools could grant teachers greater freedom in selecting technology tools and tailoring pedagogical strategies to their students' needs. Such empowerment is crucial for enhancing teachers' perceived usefulness of technology and encouraging innovative practices.

In addition to supporting autonomy, effective leadership also involves being responsive to the specific and varied needs of individual teachers. The survey in this study found that a small group of teachers disagreed that they lacked training but agreed that they encountered difficulties in learning new tools, which reveals teachers' varied experiences in learning new technology and differences in training needs. Based on this finding, school leaders should recognise that teachers may require different types of support beyond traditional training. Schools should consider alternative forms of support such as facilitating teacher collaboration, offering practical hands-on guidance, and creating peer mentoring opportunities for teachers who may struggle with conventional training approaches.

Furthermore, in educational institutions with greater financial and administrative autonomy, such as some well-resourced private schools, school leaders often have more direct power to make decisions about technology investment and professional development. With this flexibility, the leaders could ensure adequate funding for technological infrastructure, and design targeted professional development programs that address their teachers' specific needs.

11.6.4 For Educational Authorities

This study found that teacher-level factors, such as teachers' agency in using technology, their attitudes towards technology, and their technological skills, are significantly shaped by the overarching institutional context, with the availability and provision of technology resources being the most influential factor. Given that the majority of primary and secondary schools in China are public institutions administered by educational bureaus, these authorities bear primary responsibility for equipping schools with adequate technology infrastructure. Therefore, educational authorities should prioritise the provision of reliable basic infrastructure (e.g., stable internet, IWBs, and projectors) before gradually expanding access to more diverse and high-quality digital resources.

However, simply providing hardware is insufficient to achieve the vision outlined in the 2022 Curriculum Standards, which explicitly calls for the deepened integration of technology with English language teaching to cultivate students' core competencies. The findings of this study critically reveal a gap between this policy ambition and current realities: while teachers recognised the value of technology, a significant proportion of teachers from the survey reported that learning new tools remained challenging and that they lacked sustained professional development support. This highlights a limitation in existing training models, which are often one-off, and disconnected from teachers' daily classroom contexts, thereby constraining teachers' agency and their ability to translate policy mandates into effective pedagogical practices.

To bridge this gap, educational authorities should design more realistic and impactful professional learning opportunities tailored to teachers' needs. First, sustained, school-based hands-on workshops could be implemented, focusing on strategies for integrating technology, such as the scaffolded learning strategies identified in this study. Second, structured peer-learning communities or "teaching-research-training" cycles could be established at district or school level, where teachers collaboratively design, trial, and reflect on technology-enhanced lessons through lesson study or peer observation, approaches that require minimal additional funding but directly address the practical challenges reported by participants. Third, short, modular online micro-courses combined with in-school mentoring could offer flexible, just-in-time support for teachers who find learning new tools daunting, allowing them to build confidence incrementally while aligning with the 2022 Curriculum Standards' emphasis on teacher reflection and action research.

By critically addressing these professional learning needs in light of the 2022 Curriculum Standards, educational authorities can move beyond surface-level resource provision to foster genuine teacher agency, ultimately enabling more effective technology integration that benefits student learning.

11.7. Limitations of the Study

As with all research, this study is subject to several limitations that primarily stem from instrument design choices, the scale and scope of data collection, and the specific circumstances under which the data were gathered.

This study was conducted over a six-month period, which coincided with the COVID-19 pandemic. During this time, teachers experienced increased workload and responsibilities, such as administering COVID-19 tests to students. This required adaptations to the original data collection design. While the initial plan was to alternate between classroom observations and interviews, teachers' busy schedule led to a modified approach of conducting two classroom observations followed by two interviews within two weeks. This approach proved effective, as teachers were able to recall and reflect on their observed practices effectively, evidenced by their detailed

responses and specific references to classroom activities during interviews. Overall, this study has yielded rich data on teachers' perceptions and use of technology in teaching, providing valuable insights into literature.

Additionally, the sample size and geographical scope for the qualitative component were inherently limited. With only three case schools and a total of 18 EFL teachers (including EFL heads), the findings derived cannot be generalised to all Chinese primary school EFL teachers. Furthermore, as Hangzhou is an economically developed region in China, the specific conditions and findings from these schools may not be directly transferable to less developed regions or other diverse educational landscapes within China. However, the multi-case study approach offered rich, in-depth insights into teachers' perceptions and practices, potentially applicable to similar educational contexts.

One limitation of this study relates to survey design. The mixed-methods approach provided comprehensive insights into teachers' technology use, though a trade-off was that all constructs relied on only one or two questionnaire items. A more in-depth quantitative study would have allowed for more construct coverage. However, the strength of the current approach was its ability to capture a broad range of teacher experiences while maintaining reasonable survey length to ensure participant completion. This design choice was intentionally made to balance comprehensive data collection with participant burden, allowing for both quantitative patterns and rich qualitative insights that complemented each other effectively.

11.8. Suggestions for Future Research

Based on the findings and contributions of this study, several avenues for future research are recommended to further enhance our understanding of how teachers use or adopt technology in their respective EFL context.

Firstly, this study found a relationship between the frequency of technology use by teachers and their perceptions and perceived affordances of technology. To build upon this finding, future research could employ longitudinal or cross-contextual designs to investigate this dynamic over time and in a wider variety of contexts and settings. In

addition, while this study identified this relationship, it remains unclear whether frequent use leads to positive perceptions, whether positive attitudes encourage more frequent use, or whether the influence works both ways. Future research that investigates the causal direction of this relationship would inform more targeted professional development interventions and effective institutional support strategies.

Secondly, this study found that teachers need to reach a certain level of regular, consistent technology use before they begin to explore diverse applications. Future research could investigate this phenomenon by designing interventions that aim to increase initial technology use frequency among less frequent users and then observe how this impacts their willingness and ability to diversify their pedagogical approaches. This could involve exploring different types of support mechanisms needed to help teachers cross this critical point effectively. Such research could provide valuable guidance for designing more effective professional development programs and institutional support strategies for technology integration.

Thirdly, this study identified several teacher-led pedagogical strategies for technology-supported scaffolded learning in primary school EFL settings, particularly in contexts where teachers used every day and readily available technologies, rather than complex and advanced tools. Future research could continue to identify and explicitly articulate the scaffolding strategies that primary and secondary EFL teachers employ when utilising everyday technology to support student learning. Such research could offer valuable insights for supporting and improving the ways in which teachers integrate technology into their practice.

Fourthly, this study identified TAWs and the interaction between teaching experience and training recency as novel factors influencing technology adoption. Future quantitative studies could aim to empirically test and validate these proposed factors within larger samples, formally integrating them into extended TAM or UTAUT models. This would help to quantify their influence and further solidify their role as distinct constructs in technology acceptance frameworks within educational settings. Additionally, future research should explore the broader and more complex interrelationships between these newly identified factors and other existing

TAM/UTAUT constructs, as well as investigate how these constructs might be reconceptualised to encompass multiple roles within technology acceptance frameworks.

11.9. Final Words

Concluding this thesis provides an opportune moment to reflect upon the comprehensive research journey undertaken. This study, which set out to investigate Chinese primary school EFL teachers' perceptions and use of technology, as well as the factors influencing their integration of technology in teaching, has been a profoundly enriching experience for me as an emerging researcher. It commenced with an exploration of existing literature, progressed through rigorous data collection and analysis, and culminated in developing a more nuanced understanding of a complex educational phenomenon within a specific context.

The process of conducting this research has not only yielded valuable academic insights but has also fostered significant personal and intellectual growth. It has deepened my appreciation for the intricacies of educational practice, the dedication of teachers, and the dynamic interplay between technology, pedagogy, and context. The challenges encountered throughout this endeavour, including the practicalities of data collection during the pandemic and the demanding analytical process, have underscored the iterative and often challenging nature of academic inquiry. However, overcoming these hurdles has reinforced my commitment to rigorous research and my passion for understanding and contributing to the field of applied linguistics and educational technology.

Ultimately, I hope that the findings and theoretical contributions presented in this thesis will serve as a valuable foundation for future research and offer useful recommendations to policymakers, school administrators, and, most importantly, to primary school EFL teachers themselves. This journey has affirmed the importance of contextualised research in shedding light on real-world educational challenges and inspiring meaningful advancements in teaching and learning.

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Appendices

Appendix A: Questionnaire for EFL Teachers (English Version)

EFL Teachers' Perceptions and Use of Technology in Chinese Primary School Classrooms

Dear teacher, hello. This study aims to explore the perceptions and practices of primary school English teachers regarding the integration of digital technology (modern educational technology) into classroom instruction. The survey consists of 4 parts. Completing the survey will take approximately 15 minutes. Your answers are completely anonymous and cannot be traced back to you. There are no right or wrong answers. I am interested in your honest opinions. You can quit this survey at any time by “closing out” the internet browser window before submitting your survey. Please note that by completing this survey, you agree to give your consent to participate in this study. Thank you sincerely for your time and support.

Part I

In this part, please provide the following information by selecting the option which suits you:

1. What is your gender? Male Female

2. What is your age? 20-29 30-39 40-49 50-60

3. How many years do you teach English?
 5 years and below 6-10 years 11-15 years 16-20 years 21-25 years
 26-30 years over 30 years

4. How often do you use digital technologies to teach English classes?
 never rarely sometimes often always

5. What is your school type? public school private school

6. Which district of Hangzhou do you teach in?
 Xihu district Yuhang district Binjiang district Linping district Xiaoshan district
 Shangcheng district Gongshu district Qiantang district Fuyang district
 Linan district Tonglu county Chunan county Jiande county

Part II

In this part, please provide the following information by selecting the options, and you can have multiple choices. If you never use technology, you can skip this question. If you use a technology that is not listed, you can specify it in the open-ended question in the final section.

7. The following technology is available in my school classroom:

<input type="checkbox"/> Interactive whiteboard
<input type="checkbox"/> PowerPoint
<input type="checkbox"/> Internet
<input type="checkbox"/> Audio
<input type="checkbox"/> Video
<input type="checkbox"/> E-games
<input type="checkbox"/> Multimodal resources
<input type="checkbox"/> Learning software
<input type="checkbox"/> Word document
<input type="checkbox"/> Socio media (e.g., blog)
<input type="checkbox"/> MOOC
<input type="checkbox"/> tablet
<input type="checkbox"/> laptop
<input type="checkbox"/> APP
<input type="checkbox"/> videoconference
<input type="checkbox"/> E-mail
<input type="checkbox"/> Other types

8. I regularly use the following technology in my teaching:

<input type="checkbox"/> Interactive whiteboard
<input type="checkbox"/> PowerPoint
<input type="checkbox"/> Internet
<input type="checkbox"/> Audio
<input type="checkbox"/> Video
<input type="checkbox"/> E-games
<input type="checkbox"/> Multimodal resources
<input type="checkbox"/> Learning software

2) Teachers' Use of Technology

21. I use a variety of digital technology in my teaching (e.g., IWB, PPT).
22. I design learning activities using digital technologies to enhance collaborative learning to achieve knowledge co-creation and sharing.
23. I use a variety of digital technology to provide feedback to students.

3) Teachers' Perceived Affordances of Technology

25. Digital technology affords multimodal features to support learning.
26. Using digital technology has increased students' learning motivation.
27. Using digital technology in the class helps students concentrate while learning.
28. Using digital technology in the English class makes learning more interesting.
29. Digital technology facilitates students' collaborative work.
30. Using digital technology makes English lessons more interactive.
31. Students understand the learning content more easily with the support of digital technology.
32. Using digital technology improves students' academic performance.

4) Teachers' Perceived Constraints of Technology

33. There is a lack of access to digital technology in my class.
34. If something goes wrong with a digital technological tool, I will not know how to fix it.
35. When encountering technical issues in the class, there is limited technical support.
36. Learning how to use new digital technology is difficult for me.
37. Training in using digital educational technologies for teaching is lacking.
38. I usually do not have enough time to prepare lessons that integrate digital technology.
39. I do not have enough time to use digital technology to teach English in my class.

Part IV

This final section consists of several optional, open-ended questions. Please feel free to share any thoughts you have in the space provided.

40. What other digital technologies do you use in your classroom?

41. What do you think are the main benefits of using technology in your class?

42. What do you think are the main constraints of using technology in your class?

43. Is there anything else you would like to add?

Appendix B: Questionnaire for EFL Teachers (Chinese Version)

探寻中国小学英语教师对数字科技（现代教育技术）与英语教学相结合的看法与实践

尊敬的老师，您好。本研究旨在探索一线小学英语教师对于数字科技（现代教育技术）融入课堂教学的看法与实践。我们真诚地希望能了解您的真实想法，因此问卷没有正确或错误的答案。本问卷包括4部分，完成本问卷约需15分钟。您的回答将完全匿名，所有信息都无法追溯到您个人。在提交前，您可以随时通过关闭浏览器窗口退出调查。请注意，完成并提交问卷即代表您同意参与本次研究。诚挚感谢您的宝贵时间和支持。

第一部分

在本部分，请选择最符合您自身情况的选项：

1. 您的性别 男 女
2. 您的年龄区间 20-29 30-39 40-49 50-60
3. 您的教龄有多少年了
 5年以内 6-10 11-15 16-20 21-25
 26-30 30年以上
4. 您在课堂上使用数字科技进行教学的频率是多少？
 从不 很少 有时 经常 总是
5. 您的学校属于 公立学校 私立学校
6. 您的学校位于杭州市哪个行政区域

 西湖区 余杭区 滨江区 临平区 萧山区 上城区 拱墅区 钱塘区 富阳区 临安区 桐庐县 淳安县 建德县

第二部分

在本部分，请选择所有符合您情况的选项（可多选）。如果您从未使用过技术，可跳过此题。如果您选择了其他，可以在开放问题部分写出您的回答。

7. 我的教室装备有以下数字科技：

电子交互白板

<input type="checkbox"/> PPT
<input type="checkbox"/> 互联网
<input type="checkbox"/> 音频
<input type="checkbox"/> 视频
<input type="checkbox"/> 教育类电子游戏
<input type="checkbox"/> 多媒体课件
<input type="checkbox"/> 学习软件
<input type="checkbox"/> Word 文档
<input type="checkbox"/> 社交媒体（如班级博客）
<input type="checkbox"/> 慕课/微课
<input type="checkbox"/> 平板电脑
<input type="checkbox"/> 笔记本电脑
<input type="checkbox"/> APP
<input type="checkbox"/> 视频会议（如腾讯会议）
<input type="checkbox"/> 电子邮件
<input type="checkbox"/> 其他

8. 我在教学中经常使用以下数字科技：

<input type="checkbox"/> 电子交互白板
<input type="checkbox"/> PPT
<input type="checkbox"/> 互联网
<input type="checkbox"/> 音频
<input type="checkbox"/> 视频
<input type="checkbox"/> 教育类电子游戏
<input type="checkbox"/> 多媒体课件
<input type="checkbox"/> 学习软件
<input type="checkbox"/> Word 文档
<input type="checkbox"/> 社交媒体（如班级博客）
<input type="checkbox"/> 慕课/微课
<input type="checkbox"/> 平板电脑
<input type="checkbox"/> 笔记本电脑

<input type="checkbox"/> APP
<input type="checkbox"/> 视频会议（如腾讯会议）
<input type="checkbox"/> 电子邮件
<input type="checkbox"/> 其他

第三部分

在这部分，请告诉我们：1) 您如何看待数字科技在课堂上的融合，2) 您认为在课堂上使用数字科技的好处是什么，3) 您如何在课堂上使用数字科技 4) 您认为在课堂上使用数字科技的限制是什么。① 代表非常不同意，② 代表不同意，③ 代表稍许不同意，④ 代表稍许同意，⑤ 代表同意，⑥ 代表非常同意。

非常不同意 不同意 稍许不同意 稍许同意 同意 非常同意

① ② ③ ④ ⑤ ⑥

1) 使用数字科技的感受

9. 数字科技对我的教学有用。
10. 数字科技使我以更有效的方式进行教学。
11. 数字科技与教学活动设计相结合是容易的。
12. 在我的课堂教学中，数字科技是易于使用的。
13. 我对在课堂上使用数字科技感兴趣。
14. 我喜欢在教学中使用数字科技。
15. 在备课中，我对结合数字科技备课有信心。
16. 在教学中，我对使用数字科技有信心。
17. 我相信课堂上使用数字科技会提升学生的学习质量。
18. 我相信数字科技使我的教师工作变得更容易。
19. 在课堂上使用数字科技组织个人学习活动是容易的。
20. 在课堂上使用数字科技组织小组学习活动是容易的。

2) 课堂上对数字科技的使用

21. 我在教学中使用各类数字科技（如电子白板，PPT 等）。
22. 我设计融入数字科技的课堂活动来促进学生合在学习，以共建与分享知识。
23. 我运用各类数字科技给学生提供学业反馈。
24. 未来的课堂中，我有意更多地应用数字科技。

3) 在课堂上使用数字科技的好处

25. 数字科技可以呈现多媒体材料以支持学习。
26. 使用数字科技提高了学生学习的积极性。
27. 使用数字科技使学生学习时更加专心。
28. 使用数字科技使英语学习更加有趣。
29. 使用数字科技增进了学生的合作型学习方式。
30. 使用数字科技使英语课堂具互动性。
31. 在数字科技的帮助下，学生更容易理解学习内容。
32. 使用数字科技可以提升学生的学业成绩。

4) 在课堂上使用数字科技的制约因素

33. 我的教室缺乏数字科技设备。
34. 如果数字科技设备出了技术问题，我不知道如何修好它们。
35. 当在课堂中遇到技术故障时，技术支持资源有限（如无技术人员可以帮忙解决问题等）。
36. 学习如何使用新的数字科技对我来说是困难的。
37. 在如何使用数字科技进行教学方面，缺乏对教师的相关培训支持。
38. 我通常没有足够的时间来设计数字科技与英语教学相结合的课堂活动。
39. 我没有足够的时间在课堂上使用数字科技进行教学。

第四部分

本部分为最后的开放性问题，所有题目均为选答。我们非常欢迎您下方空白处，分享任何您想表达的想法或建议。

40. 您在课堂中使用的其他数字科技是什么？

41. 您认为在您的课堂中使用数字科技教学的主要限制是什么？

42. 您认为在您的课堂中使用数字科技教学的主要增益是什么？

43. 您还有什么需要补充的吗？

Appendix C: Interview Protocol for EFL Teacher

First interview

1. Could you introduce yourself please?
2. Could you please tell me about your English teaching experience? How long have you been teaching at this school for?
3. What digital technology do you have access to in your teaching? What digital technology do students have access to? How long have you been using technology in your teaching?
4. Could you tell me about your experience using technology in your teaching?
5. What technologies do you usually use in teaching?
6. On a typical day, how do you utilize technology in your classroom? What does learning with technology look like? Can you give an example?
7. How do you feel about the use of technology in the classroom?
8. How easy or difficult do you think it is to use technology for teaching? Why?(IWB, PPT, internet, video, audio, e-games, multimodal courseware, social media, MOOC, tablet, video conference, email, app, etc.) Are there some advanced types of technology you find difficult to use?
9. What do you think are the benefits of using technology in the classroom? (making class interesting, making class more interactive, motivating students, improving the quality of teaching, increasing students' cognitive understanding, improving students' learning achievements, engaging students, enabling multimodal resources to be presented to support teaching)
10. In one of the activities, xxx, I noticed some interesting xxx, could you please share more with me about that? (How you use technology with ...activity?)
11. Why did you choose to use this technology for that activity?
12. How do you use technology to support group work? How do you use technology to support individual work? What is the difference in your application of technology between using technology for independent work and using technology for group work?
13. Do you think technology supports students' interaction and co-construction of knowledge? If so, how technology supports? Can you give an example? If not, why?
14. How confident are you to use technology in teaching?

15. How confident are you in learning to use new technology that you haven't used before?
16. Do you think you possess sufficient technology skills to confidently carry out technology integrated activities in class? If the answer is negative, please mention the skills that you need.
17. What kind of knowledge do you think you need in teaching with technology? (pedagogical knowledge, content knowledge, technical knowledge, etc.) Do you possess these knowledge?
18. Can you tell me how you use technology to assess students?
19. Why did you choose to use this technology for assessment?
20. Do you think technology can contribute to students' English development and English performance on assessments? If so, how? If not, why not?
21. How have your students responded to the use of technology in language learning?
22. How do parents respond to technology integration in EFL class?
23. What differences do the use of technology bring to the classroom compared with a traditional classroom?
24. Are there any changes that you would like to make in the way you use technology in the future?
25. Is there anything else you would like to add/let me know....

Second interview

1. I am very impressed with your class yesterday. Could we talk a bit about it? In one of the activities, xxx, I noticed some interesting xxx, could you please share more with me about that? How did that work? Why do you think so?
2. Does your school promote the use of technology? How?
3. Do you have all the relevant tools/equipment to support the teaching method you use? If infrastructure facilities are improved, would you carry out more technology integrated activities?
4. What factors have supported/stimulated your teaching with technology in class? (technical support, parent support, technology accessibility, subjective norms, benefits in teaching, teachers' personal preference, teachers' technology competence, teachers' technology self-efficacy, training, policy influence, etc.)

5. What concerns or challenges prevent you from using technology? Do you have any specific examples you would like to share? (Inadequate infrastructure, technical problem, lack of technology skills, lack of pedagogical teacher training, lack of technical training, lack of technology confidence, lack of suitable digital educational resources, rigid structure of traditional education systems, time constraints, belief, etc.)
6. What do you do when something goes wrong? Can you give an example?
7. Did you receive training on how to use technology in lesson preparation and teaching? Whether digital technology integration into English class has been introduced into your training programs?
Do you feel that these training have addressed some of your concerns for you? Do these trainings seem adequate?
8. Do the training and professional development help you to develop the digital literacy skills necessary for language teaching? Who organize these training/professional development programs?
9. Are there any areas you feel you need more training?
10. Do you and your colleagues share digital teaching materials? Any examples?
11. Do you and your colleagues discuss your experiences of technology-integrated teaching? Any examples?
12. What advice would you give to a new teacher starting in your school who has not used technology in their teaching before?
13. What do you think about the future of technology in terms of the teaching of EFL?
14. Is there anything else you would like to add/let me know....

Appendix D: Interview Protocol for EFL Head

1. Could you introduce yourself please?
2. Could you please tell me something about your school?
3. How long have you been the department head of EFL at this school?
4. What are the school policies of technology use and integration into the classroom?
5. What do you think of the policy of ...?
6. Can you talk about the impact of XX policy on technology integration into the classroom?
7. Can you tell me why technology was implemented in your school?
8. Were you involved in any of the decisions taken around the choice of technology and use of technology? Which decision? Why?
9. How long has technology been used for teaching in your school?
10. What technology has been introduced to the English classroom?
11. What was technology integration into English classes like at the start? How did the teachers respond? How did the students respond? And parents?
12. How do EFL teachers plan teaching and lessons? Do they work collaboratively or solely? What process is it like? Could you please share some examples?
13. How digital technology are used in lesson and teaching planning? How do teachers think about engaging with digital technology in the planning stage?
14. What do the EFL teachers in your schools think of using technology in the classroom?
15. What do you think the EFL teachers in your school see as the benefits of using technology in the classroom?
16. What concerns or challenges prevent the EFL teachers from using technology? Do you have any specific examples you would like to share?
17. What support is available for teachers who encounter difficulties in technology integration?
18. Are there any English teachers who are hesitant or resistant to adopting digital technology into classroom teaching? How and in what ways did you do to

encourage teachers to value technology integration into English language teaching? Did they work? What do you plan to do next?

19. What do you think about the impact of technology integration into English class for student learning and performance?
20. What do parents think about technology integration into English teaching? Could you share some examples if possible?
21. What changes do you anticipate seeing in the future in terms of technology use and integration in EFL classes?
22. Is there anything else you would like to add/let me know....

Appendix E: Interview Protocol for School Principal

1. Could you introduce yourself, please?
2. Could you please tell me something about your school?
3. How long have you been the school principal at this school?
4. What are the school's requirements for technology use and integration into the classroom?
5. What do you think of the policy of ...?
6. Can you talk about the impact of XX policy on technology integration into the classroom?
7. Can you tell me why technology was implemented in your school?
8. Were you involved in any of the decisions taken around the choice of technology and use of technology? Which decision? Why?
9. How long has technology been used for teaching in your school?
10. What technology has been introduced to the English classroom?
11. What was technology integration into English classes like at the start? How did the teachers respond? How did the students respond? And parents?
12. What do the EFL teachers in your schools think of using technology in the classroom?
13. What do you think the EFL teachers in your school see as the benefits of using technology in the classroom?
14. What concerns or challenges prevent the EFL teachers from using technology? Do you have any specific examples you would like to share?
15. What support is available for teachers who encounter difficulties in technology integration?
16. Are there any English teachers who are hesitant or resistant to adopting digital technology into classroom teaching? How and in what ways did you do to encourage teachers to value technology integration into English language teaching? Did they work? What do you plan to do next?
17. What changes do you anticipate seeing in the future in terms of technology use and integration in EFL classes?

18. Is there anything else you would like to add/let me know....

Appendix F: Classroom Observation Checklist

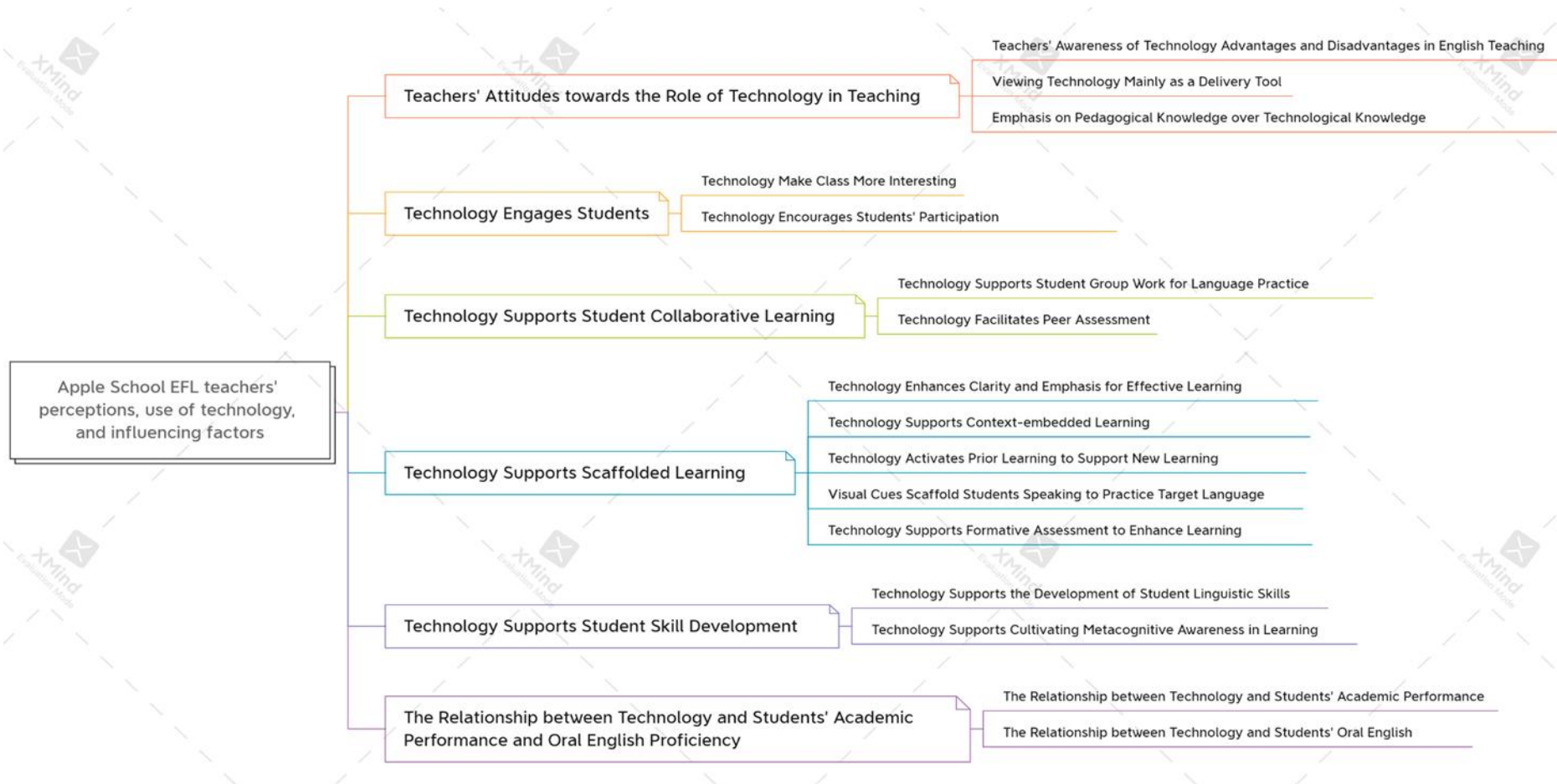
Classroom Observation Checklist	
School name	
Teacher name	
Course name	
Student grade level	
Observation date	
Clock time for observation	
Teaching content	
Course material	

Physical setting:

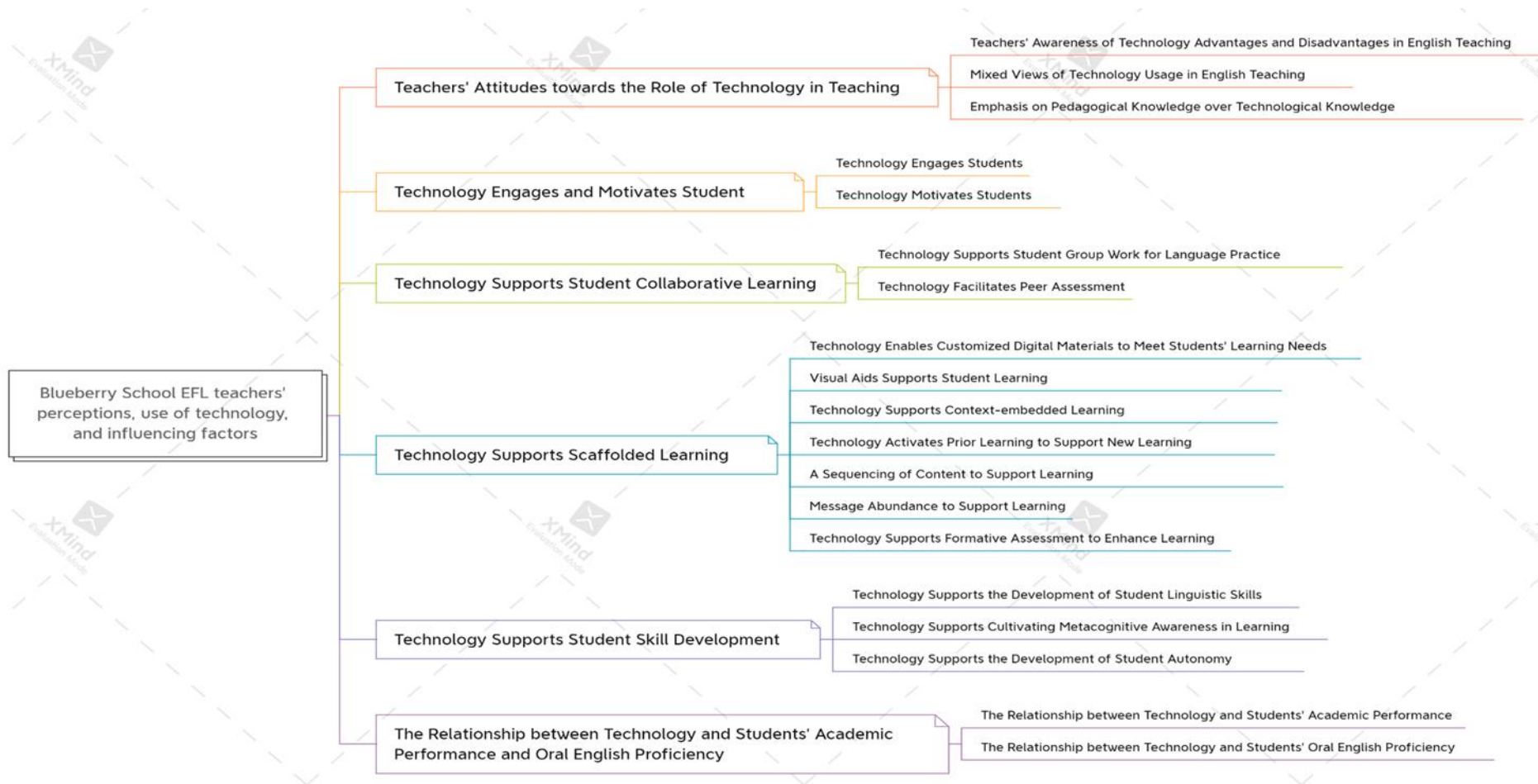
Activity	Technology use	What is the teacher doing?	What are the students doing?	Benefits of technology	Notes

Other reflections:

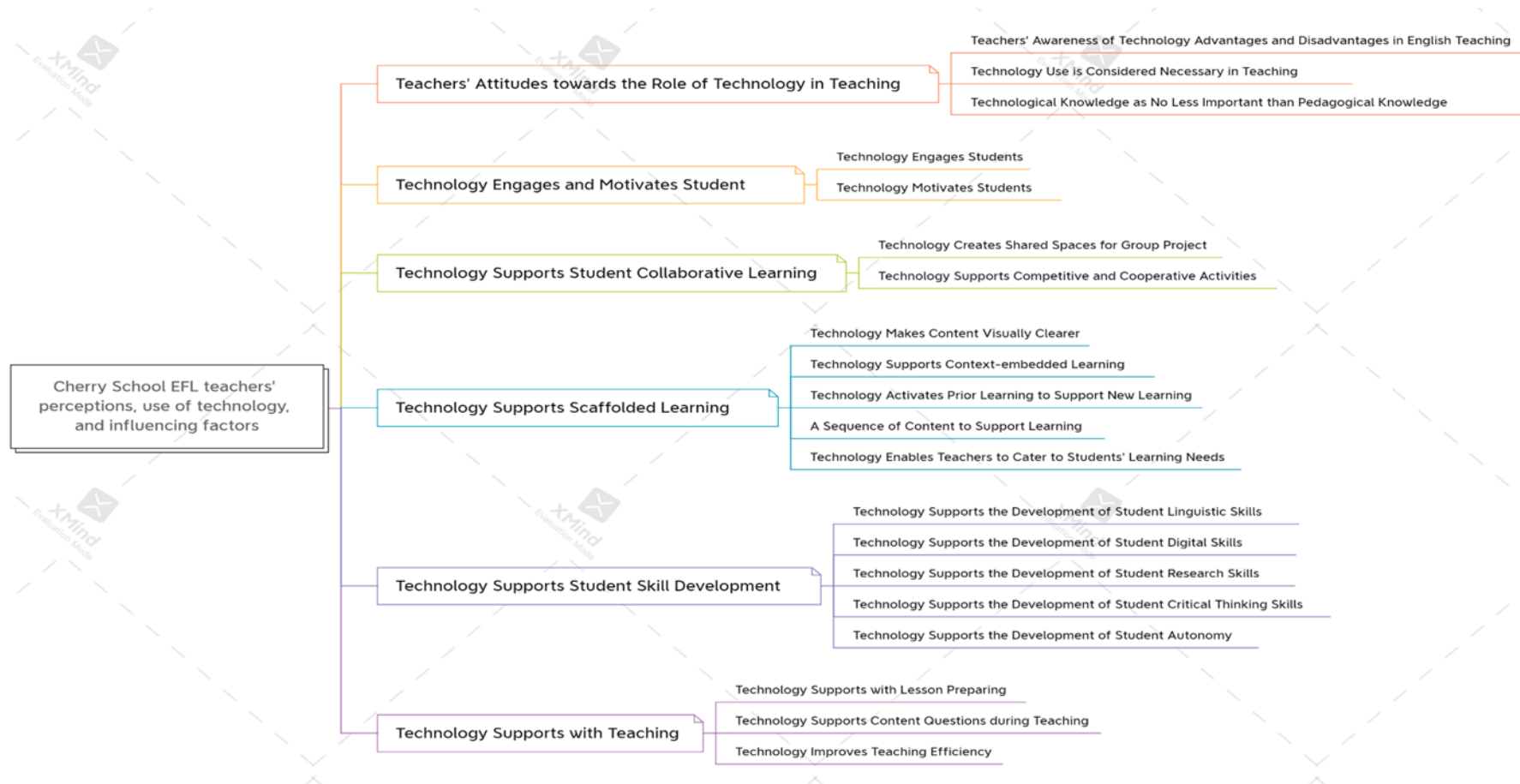
Appendix G: Thematic Map of Findings for Apple School



Appendix H: Thematic Map of Findings for Blueberry School



Appendix I: Thematic Map of Findings for Cherry School



Appendix J: Information Sheet for School Approval

(English Version)

Dear Mr/Ms xx (School Principal),

Hello, my name is Gu Jingwen. I am a doctoral candidate in the Applied Linguistics program at Massey University, New Zealand. My doctoral project aims to explore Chinese primary school EFL teachers' perceptions and practices around technology integration so as to provide useful information about technology use in EFL classes to stakeholders, such as educators and policymakers, in the future. I am recruiting Chinese primary school principals, EFL heads, and EFL teachers who use technology in teaching practice.

Participation in this study will last approximately five to six weeks. If you give me approval of conducting fieldwork in your school, could I please:

1. interview you and EFL head participants once to find out your view of how the EFL teachers at your school perceive technology, what factors the EFL teachers perceive to support or impede their use of technology, and the EFL teachers' practice with technology in class (approximately 60 minutes every time)?
2. access to the contact details for EFL teachers? I would like to contact them to ask them to participate in my project, which will involve the following:
 - 2) look at EFL teacher participants' teaching plans prior to the classroom observation.
 - 3) observe EFL teacher participants' class while they are teaching (two times per teacher).
 - 4) interview EFL teacher participants twice to discuss how they perceive technology integration in class, the factors they perceive as supporting or impeding technology integration in class, and the rationale behind their use of particular technology tools in teaching (approximately 60 minutes per time).

This project has been evaluated by peer review and judged to be low risk. Individual participation is voluntary and there are no consequences for choosing not to participate or withdrawing from the study. In terms of class observation, I will sit silently in the classroom and ensure that the classes will not be interrupted by me. Additionally, the confidentiality of all participants will be maintained. The data will be kept secure, and password protected. Moreover, I am an independent researcher

responsible for protecting the privacy of the information associated with individual participants. I will not share information about a participant with other people. Lastly, I will not evaluate or make judgments about teachers' teaching and participants' opinions.

Any additional questions regarding the project can be directed to me, Gu Jingwen, at 13123936105 or kaikouhua@outlook.com. Please email me if you are interested in this project. Thank you very much.

Respectfully,
Gu Jingwen

Appendix K: Information Sheet for School Approval

(Chinese Version)

尊敬的 xx 校长：

您好！

我是顾静雯，新西兰梅西大学应用语言学专业的在读博士生。我的博士研究课题旨在探究中国小学英语（EFL）教师对于技术整合的认知与实践，从而为教育工作者和政策制定者等相关方，在未来英语课堂的技术应用方面提供有效信息。我正在招募使用技术进行教学实践的中国小学校长、英语教研组长以及英语教师参与本项研究。

本研究的参与周期约为五到六周。若能获得您的批准，在贵校开展实地研究，我希望能进行以下工作：

1. 对您和学校的英语教研组长进行一次访谈，以了解您对于贵校英语教师如何看待技术、教师们认为哪些因素支持或阻碍了技术的使用，以及他们在课堂中的技术应用实践等问题的看法（每次访谈约 60 分钟）。
2. 获得贵校英语教师的联系方式，以便我能联系他们并邀请其参与本研究。研究将涉及以下内容：1）在观课前，浏览参与教师的教学计划。2）观察参与教师的课堂教学（每位教师两节课）。3）对参与教师进行两次访谈，以探讨他们如何看待课堂技术整合、认为哪些因素支持或阻碍了技术整合，以及他们在教学中使用特定技术工具缘由。

本项目已通过同行评审，被评定为低风险研究。个人参与完全自愿，选择不参与或中途退出不会产生任何负面影响。在课堂观察期间，我将安静地坐在教室内，确保不会对正常教学造成任何干扰。此外，所有参与者的个人信息都将被严格保密，所有研究数据都将安全存储并设置密码保护。同时，我作为一名独立研究者，将负责保护与每位参与者相关的个人隐私信息，绝不会将参与者的信息透露给任何其他人。最后，我声明本研究不会对教师的教学水平或参与者的观点进行任何形式的评估或评判。

若您对本项目有疑问，欢迎随时通过电话（13123936105）或电子邮件（kaikouhua@outlook.com）与我联系。如果您对本项目感兴趣，恳请通过邮件告知。非常感谢！

谨致

顾静雯

Appendix L: School Approval Form

(English Version)

Project Title: Using technology in EFL classes

Researchers: Jingwen Gu **Supervisors:** Karen Ashton; Grace Qi

I have read the School Approval Information Sheet and understand the nature of the research and why I have been asked for consent. I have had the opportunity to ask questions and have them answered to my satisfaction.

- I agree to give the researcher my approval to do fieldwork in my school.

A summary of the findings could be provided to me at the following email address:

_____.

Appendix M: School Approval Form

(Chinese Version)

研究课题名称: 英语课堂中的技术应用

研究者: 顾静雯

指导教师: Karen Ashton; Grace Qi

我已阅读《申请在贵校开展研究的信息说明函》，并已理解研究的内容和性质。我有机会就相关问题进行提问，并获得了满意的解答。

我同意批准研究者在我校进行实地研究工作

本研究的成果摘要可发送至我的电子邮箱: _____。

Appendix N: Information Sheet for EFL Teachers

(English Version)

Project title: Using technology in EFL classes

Researcher: Jingwen Gu **Supervisors:** Karen Ashton; Grace Qi

My name is Gu Jingwen. I am doing a research project on Chinese primary school EFL teachers' perceptions and practices around technology integration. This project is for my Ph.D. in Applied Linguistics at Massey University. I have previously taught English in Suzhou and Hangzhou, China.

To help you make an informed decision regarding your participation, this letter will explain what the study is about, the possible risks and benefits, and your rights as a research participant. If you do not understand something in the letter, please contact me. You will be provided with a consent form if you choose to participate in the study.

What is the project about?

This project helps us to understand your perceptions of using technology and how you use technology to teach in class.

What is the researcher going to do?

- To help me understand your classroom context and how you teach in class, I would like to observe two of your classes. I will sit quietly in the classroom and observe without interrupting your teaching. I will take notes but not audio or video record anything.
- To help me understand the class I observe, I would like to see your teaching plan before the classroom observations.
- To help me understand your perceptions and practices around technology integration in English class, I would like to interview you twice for 60 minutes each time. The interviews will be audio-recorded.

What rights do I have as a participant?

- Participation is voluntary, and you are entitled to withdraw at any time during the data collection process. However, you can only withdraw your data before the final interviews in the case school, because after that, the researcher will transcribe the interviews.
- You can refuse to answer any questions in the interview and request the recording be stopped at any time without giving a reason.

- You can ask the researcher any questions about the project at any time.
- You can check and make any changes to the researcher's transcripts of the interviews if you would like to.
- If you want, you can get a summary or a copy of the project when it is finished. As a thank you for your participation in this research, the researcher will give each of you a gift (or multiple smaller gifts) worth about 100-200RMB (approx. 25-50NZD) once the data collection is completed.

What are the risks associated with the study?

There are no known or anticipated risks associated with participation in this study.

Will my identity be known?

The researcher will use pseudonyms to represent the participants and de-identify the data. Therefore, your identity will not be known except to the researcher.

Will my information be kept confidential?

- The information you share will be kept confidential by the researcher carefully.
- The schools, classes and EFL teachers are unidentifiable from the way the researcher writes up her report.
- Your information will be securely stored on a password-protected computer. The data will be encrypted. Hard copies will be locked in cabinets.
- Only the researcher and the supervisors can access the data.

How will the data be managed?

- The collected data will only serve for the researcher's doctoral thesis or be used for conference presentations and journal publications. The data will not be used for any new purpose.
- After five years, all hard copy data will be shredded, and the digital information will be deleted permanently.

Who is sponsoring/funding this study?

This study is funded by the Massey-CSC scholarship.

Who should I contact if I have questions regarding my participation in the project?

If you have any questions regarding this project or would like additional information to assist you in reaching a decision on participation, please contact me at 13123936105 or by email at kaikouhua@outlook.com or my supervisors: Dr. Karen Ashton (K.Ashton@massey.ac.nz), Dr. Grace Qi (G.Qi@massey.ac.nz).

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Prof Craig Johnson, Director, Research Ethics, telephone 06 356 9099 x 85271, email humanethics@massey.ac.nz.

Appendix O: Information Sheet for EFL Teachers

(Chinese Version)

研究课题名称： 英语课堂中的技术应用

研究者： 顾静雯

指导教师： Karen Ashton; Grace Qi

您好！

我是顾静雯，目前是新西兰梅西大学应用语言学专业的博士生。我正在进行一项关于中国小学英语教师对技术整合的认知与实践的研究。此项目是我的博士学位研究课题。我曾先后在中国苏州和杭州担任过英语教师。

为了帮助您在充分知情的情况下决定是否参与本研究，本函将阐述研究内容、可能的风险与增益，以及您作为研究参与者的权利。如果您对信中内容有任何不解之处，请随时与我联系。如果您决定参与，我将为您提供一份知情同意书。

本研究关于什么？

本项目旨在帮助我们理解您对使用技术的看法，以及您在课堂中如何应用技术进行教学。

研究者需要做什么？

- 为了解您的课堂环境与教学方式，我希望能观摩您 2 节课。在观课期间，我将安静地坐在教室内，不会打扰您的正常教学。我仅会做文字记录，不会进行任何录音或录像。
- 为了更好地理解我所观察的课堂，我希望能于观课前浏览您的教学计划。
- 为了解您对英语课堂中技术整合的认知与实践，我希望能与您进行两次访谈，每次约 60 分钟。访谈过程将会被录音。

作为参与者，我有哪些权利？

- 参与完全自愿，在数据采集过程中的任何时间点，您都有权退出。但请注意，您只能在学校最终访谈结束前撤回您的数据，因为在那之后，我将开始对访谈录音进行转录。

- 您可以拒绝回答访谈中的任何问题，也可以在任何时候要求停止录音，无需提供任何理由。
- 您可以随时就本研究向我提出任何问题。
- 如果需要，您可以审阅并修改我根据访谈录音整理的文字稿。
- 研究结束后，如果您需要，可以获取一份研究成果的摘要或完整副本。

为感谢您参与本研究，在数据采集全部完成后，我将赠送您一份价值约 100-200 元人民币的礼物（或多份小礼物）。

本研究存在哪些风险？

参与本研究不存在任何已知或可预见的风险。

我的身份会被泄露吗？

研究中将使用化名来指代所有参与者，并对数据进行匿名化处理。因此，除了研究员本人，您的身份不会被任何人知晓。

我的信息会被保密吗？

- 您分享的所有信息都将被我严格保密。
- 在研究报告的撰写中，学校、班级和英语教师的身份信息将无法被识别。
- 您的信息将被安全地存储在有密码保护的电脑中，数据将被加密。纸质材料将被锁在文件柜中。
- 只有研究员和指导教师可以接触到这些数据。

数据将如何管理？

- 所采集的数据将仅用于我的博士论文，或用于学术会议报告及期刊论文发表，不会用于任何新的目的。
- 五年后，所有纸质数据将被粉碎销毁，电子信息将被永久删除。

本研究由谁赞助/资助？

本研究由梅西大学-国家留学基金委（Massey-CSC）奖学金提供资助。

如果对参与研究有疑问，我应联系谁？

如果您对本项目有任何疑问，或希望获得更多信息以帮助您决定是否参与，请通过电话（13123936105）或电子邮件（kaikouhua@outlook.com）与我联系，或联系我的指导教师：Dr. Karen Ashton (K.Ashton@massey.ac.nz) 和 Dr. Grace Qi (G.Qi@massey.ac.nz)。

伦理声明:

本项目已通过同行评审，并被界定为低风险研究。根据大学规定，此类研究无需再提交至校级人权伦理委员会进行正式审查。上述署名研究员将对本研究的全部伦理行为负责。

如果您对本研究的执行方式有任何疑问，且希望向研究员以外的人士反映，请联系研究伦理主任 Craig Johnson 教授，电话 06 356 9099 转 85271，电子邮件 humanethics@massey.ac.nz。

Appendix P: Consent Form for EFL Teachers

(English Version)

Project Title: Using technology in EFL classes

Researchers: Jingwen Gu **Supervisors:** Karen Ashton; Grace Qi

I have read the Participant Information Sheet and understand the nature of the research and why I have been asked for consent. I have had the opportunity to ask questions and have them answered to my satisfaction.

- I agree to share my teaching plans with the researcher.
- I agree to have my lessons observed when I am teaching.
- I agree to have my interviews audio recorded.
- I agree to participate in this study under the conditions set out in the Information Sheet.

A summary of the findings will be provided to me via the following email:

_____.

Appendix Q: Consent Form for EFL Teachers

(Chinese Version)

研究课题名称： 英语课堂中的技术应用

研究者： 顾静雯

指导教师： Karen Ashton; Grace Qi

我已阅读《致英语教师的研究信息说明函》，并已理解本研究的内容和性质。我有机会就相关问题进行提问，并获得了满意的解答。

- 我同意与研究者分享我的教学计划。
- 我同意研究者在我授课时进行课堂观察。
- 我同意对我的访谈进行录音。
- 我同意在《信息说明函》所述的条件下参与本项研究。

_____。

本研究的成果摘要可发送至我的电子邮箱：_____。

Appendix R: Teaching Years Impact on Teachers' Perceptions of Technology

Items	Teaching Years	Median (Q1~Q3)	Z value	Asymp. Sig. (2-tailed)
9 Useful	0-10	6(6~6)	1.047	0.593
	11-20	6(5~6)		
	>20	6(5~6)		
10 Helps	0-10	6(6~6)	1.746	0.418
	11-20	6(5~6)		
	>20	6(5~6)		
11 EasyDesign	0-10	6(5~6)	2.904	0.234
	11-20	6(5~6)		
	>20	5(5~6)		
12 Easy	0-10	6(5~6)	1.406	0.495
	11-20	6(5~6)		
	>20	5(5~6)		
13 Interest	0-10	6(5~6)	1.586	0.453
	11-20	6(5~6)		
	>20	6(5~6)		
14 Enjoy	0-10	6(5~6)	1.697	0.428
	11-20	6(5~6)		
	>20	6(5~6)		
15 ConfidentPrep	0-10	6(5~6)	4.307	0.116
	11-20	5(5~6)		

	>20	5(4~6)		
16 ConfidentUse	0-10	6(5~6)	5.191	0.075
	11-20	5(5~6)		
	>20	5(4~6)		
17 Improve	0-10	6(5~6)	1.092	0.579
	11-20	6(5~6)		
	>20	6(5~6)		
18 MakesEasy	0-10	6(5~6)	1.095	0.578
	11-20	6(5~6)		
	>20	6(5~6)		
19 Individual	0-10	5(5~6)	1.972	0.373
	11-20	5(5~6)		
	>20	5(4~6)		
20 Group	0-10	5(5~6)	6.495	0.039 (<0.05)
	11-20	5(4~6)		
	>20	5(4~6)		
24 IntentionMore	0-10	6(5~6)	2.53	0.282
	11-20	6(5~6)		
	>20	5.5(5~6)		

Appendix S: Frequency Impact on Teachers' Perceptions of Technology

Items	Frequency	Median (Q1~Q3)	Z value	Asymp. Sig. (2-tailed)
9 Useful	Less Often	5(5~6)	-5.552	<0.01
	Often	6(6~6)		
10 Helps	Less Often	5(5~6)	-6.389	<0.01
	Often	6(6~6)		
11 EasyDesign	Less Often	5(4~5)	-4.491	<0.01
	Often	6(5~6)		
12 Easy	Less Often	5(4~5)	-4.878	<0.01
	Often	6(5~6)		
13 Interest	Less Often	5(4~5.75)	-5.194	<0.01
	Often	6(5~6)		
14 Enjoy	Less Often	5(4.25~5)	-5.46	<0.01
	Often	6(5~6)		
15 ConfidentPrep	Less Often	5(4~5)	-5.089	<0.01
	Often	6(5~6)		
16 ConfidentUse	Less Often	5(4~5)	-4.727	<0.01
	Often	6(5~6)		
17 Improve	Less Often	5(4.25~5)	-5.352	<0.01
	Often	6(5~6)		

18 MakesEasy	Less Often	5(4~5.75)	-4.268	<0.01
	Often	6(5~6)		
19 Individual	Less Often	5(4~5)	-4.174	<0.01
	Often	6(5~6)		
20 Group	Less Often	5(4~5)	-3.667	<0.01
	Often	5(4~6)		
24 IntentionMore	Less Often	5(5~5.75)	-4.483	<0.01
	Often	6(5~6)		

Appendix T: Frequency Impact on Teachers' Perceived Affordances of Technology

Items	Frequency	Median (Q1~Q3)	Z value	Asymp. Sig. (2-tailed)
25 Multimodal	Less Often	5(5~5)	-5.632	<0.01
	Often	6(5~6)		
26 Increase Motivation	Less Often	5(4.25~5)	-5.474	<0.01
	Often	6(5~6)		
27 Concentrate	Less Often	5(4~5)	-3.559	<0.01
	Often	6(5~6)		
28 More Interesting	Less Often	5(5~5.75)	-5.282	<0.01
	Often	6(5~6)		
29 Collaborative Work	Less Often	5(4~5)	-3.968	<0.01
	Often	6(5~6)		
30 Interactive	Less Often	5(4~5.75)	-4.878	<0.01
	Often	6(5~6)		
31 Understanding	Less Often	5(4~5.75)	-4.878	<0.01
	Often	6(5~6)		
32 Performance	Less Often	5(4~5)	-3.994	<0.01
	Often	6(5~6)		

Appendix U: School Type on Teachers' Perceived Affordances of Technology

Items	Frequency	Median (Q1~Q3)	Z value	Asymp. Sig. (2-tailed)
25 Multimodal	Public School	6(5~6)	-0.1	0.92
	Private School	6(6~6)		
26 Increase Motivation	Public School	6(5~6)	-0.134	0.894
	Private School	6(5~6)		
27 Concentrate	Public School	6(5~6)	-1.584	0.113
	Private School	5(4~6)		
28 More Interesting	Public School	6(5~6)	-0.464	0.643
	Private School	6(5~6)		
29 Collaborative Work	Public School	6(5~6)	-1.984	0.047 (<0.05)
	Private School	5(4~6)		
30 Interactive	Public School	6(5~6)	-1.121	0.262
	Private School	6(5~6)		
31 Understanding	Public School	5(5~6)	-1.121	0.262
	Private School	6(5~6)		
32 Performance	Public School	5.5(5~6)	-0.85	0.395
	Private School	5.5(4~6)		

Appendix V: Frequency Impact on Teachers' Perceived Constraints of Technology

Items	Frequency	Median (Q1~Q3)	Z value	Asymp. Sig. (2-tailed)
Lack Access	Less Often	4(2~5)	-2.478	0.013 (<0.05)
	Often	2(1~4.75)		
Know Fix	Less Often	5(4~5)	-0.214	0.830
	Often	5(4~6)		
Limited Support	Less Often	5(4~5)	-0.777	0.437
	Often	4(3~6)		
Difficult Learn	Less Often	4(3~5)	-1.986	0.047 (<0.05)
	Often	3(2~5)		
Lack Training	Less Often	4(4~5)	-1.552	0.121
	Often	4(2~5)		
No Time Prepare	Less Often	4(3~5)	-1.469	0.142
	Often	4(2~5)		
No Class Time	Less Often	4(3~5)	-2.941	0.03 (<0.05)
	Often	3(2~4)		

Appendix W: Frequency Impact on Teachers' Use of Technology

Items	Frequency	Median (Q1~Q3)	Z value	Asymp. Sig. (2-tailed)
Variety	Less Often	5(5~6)	-5.213	<0.01
	Often	6(5~6)		
Collaboration	Less Often	5(4~5)	-4.795	<0.01
	Often	6(5~6)		
Variety Feedback	Less Often	5(4~5)	-3.246	0.01
	Often	5.5(5~6)		