

In-Service Teachers' Perceptions of Technology Integration in English as a Foreign Language Classrooms in China: A Multiple-Case Study

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Abstract

Purpose: This study investigates university in-service English as a Foreign Language (EFL) teachers' perceptions of technology integration and the relevant factors that may affect their technology integration in the classroom.

Design/Approach/Methods: This multiple case study applies Teo's extended technology acceptance model (TAM) and the theory of teacher value beliefs associated with using technology to explore seven in-service EFL teachers' perceptions of effective technology integration and the challenges they encountered.

Findings: This study suggests that (1) perceived usefulness and (2) teacher value beliefs are two important factors that influence in-service teachers' technology integration. Additional factors are (3) subjective norm, (4) facilitating conditions of the environment, and (5) cultural values.

Originality/Value: This study contributes to the existing literature on in-service EFL teachers' technology integration and increases the applicability of the extended TAM in China. This study also provides insights into these teachers' perceptions and practices of technology integration. Finally, insights gleaned from this study will guide school-level, local, and national educational policy groups on optimally supporting in-service teachers' future technology integration.

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Keywords

English language teaching, teacher perceptions, teacher value beliefs, technology acceptance model, technology integration

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Educational technology in the new era

The ubiquitous nature of technology has changed the nature of teaching and learning practices. With the routine use of technologies for social practices, many teachers and students are users of at least some of the new tools, resources, and practices that may be beneficial in language teaching (Chapelle & Sauro, 2017). In the last decade, higher education institutions have been encouraged to increase the value of their educational products and incorporate innovations to meet global challenges (Hoffman, 2013). The fierce competition in the higher education sector also drives the universities to “think outside the box” (Rogers, 2000). For universities to maintain competitiveness, they must seize the opportunity to utilize technological advancement to improve teaching efficiency and achieve better learning outcomes.

Technology has become increasingly important in teaching English as a Foreign Language (EFL) as it offers students a variety of language inputs, improves student motivation, and provides students with authentic language learning contexts (Nim Park & Son, 2009; Strickland & O’Brien, 2013). The growing affordances of computer technology also support EFL teaching and learning by providing multimedia resources, meaningful activities, and language practice, allowing learners to authentically develop and integrate their listening, speaking, reading, and writing skills (Kulavuz-Onal, 2018).

Research on technology acceptance in teaching and learning has recently become popular (Granić & Marangunić, 2019), and meaningful technology integration in educational settings has been emphasized (Scherer et al., 2019). However, technological development cannot be assumed to automatically benefit language teaching and learning. Teachers’ perceptions of technology may affect their teaching practices. This, in turn, affects student learning. Therefore, it is important to understand teachers’ perceptions of technology integration.

Definition of technology integration

In this study, *technology integration* is defined as “the degree to which technology is used to facilitate teaching and learning” (Ertmer, 1999, p. 50). It is an umbrella term that refers to the use of all kinds of technology resources in the classroom in a way that is meaningful and connected to the goals of the class (Healey et al., 2008). It includes teachers’ use of technology for: preparing

teaching materials, delivering course content, directing student use of technology outside the classroom, and managing the classroom (adapted from the classification of Russell et al., 2003). Although teacher-directed student use of technology generally happens outside the classroom, it is considered part of *technology integration* because the direction or recommendation is made within the classroom.

The term *technology integration* differs from *technology acceptance*. Technology acceptance focuses on whether technology is generally *used* by the teachers, whereas technology integration emphasizes the *integration* of technology for *pedagogical purposes*. In other words, simply using technology tools in the classroom cannot be considered technology integration unless it is used for achieving pedagogical goals (Okojie et al., 2006). For example, playing online videos unrelated to the course content cannot be considered technology integration if the activity only entertains students and does not have a pedagogical purpose.

Teacher's role in technology integration

The rapid development of technology has altered educational practices. Although technology integration is prevalent in the classroom context, the degrees to which technology is integrated and the styles of technology integration vary. One possible explanation is that the classroom practices reflect what teachers believe constitutes quality instruction (Judson, 2006). When introduced to new technology, teachers often assess if it is relevant to their pedagogical goals and adds value to their teaching. Teachers are unlikely to incorporate technology into their practices without specific connections to their teaching content or pedagogical goals (Ottenbreit-Leftwich et al., 2010). The full potential of technology in education can only be realized when teachers have a positive attitude towards the value and effectiveness of integrating technology into their classrooms (Li & Walsh, 2011; Yang & Huang, 2008). Therefore, to help university EFL teachers better incorporate technology into their classrooms, it is essential to investigate teachers' perceptions of effective technology integration and the challenges and barriers they encounter in their technology integration.

Technology integration in English education in China

English is a compulsory subject in China's national curriculum and has become increasingly important since it was first included in China's national college entrance exams in 1978 (Li, 2020). Most students begin to receive their formal English education in Grade 3. At the tertiary level, all non-English-major undergraduates are required to learn College English and are highly encouraged to take the College English Test Band 4 (CET 4) before graduation. College English courses are general education courses designed to cultivate students' listening, speaking,

reading, writing, and translation skills. College English I—IV are compulsory courses, and undergraduate students are generally required to complete these within their first 2 years of study. Many universities have also opened a range of elective College English courses to be voluntarily taken by undergraduate students in year 3, such as Business English, English for Arts, Translation, and English for Academic Purposes.

Due to the increasing popularity of computer technology, the *College English Curriculum Requirements (2007 Requirements)* stress the importance of using modern information technology to promote teaching innovation (Xu & Fan, 2017). *The 2015 Guidelines on College English Teaching (2015 Guidelines)* urge tertiary institutions to use information communication technology fully and create a diverse teaching and learning environment (Xu & Fan, 2017). The *2020 Guidelines* are built on its predecessors and point out that college English teachers (i.e., lecturers and professors who typically have a master's degree or higher) should actively promote the integration of modern information technology into teaching and learning, integrate information technology in classroom teaching, and use online high-quality teaching resources to improve and expand teaching content (The Ministry of Education of the People's Republic of China [MOE], 2020). In 2012, the Ministry of Education promulgated the *Ten-Year Development Plan for Education Information (2011–2020)*. According to the *Development Plan (2011–2020)*, technology should be integrated into teaching and learning processes across subjects (Huang et al., 2019).

Despite the MOE's pervasive promotion of technology integration at the national policy level, these policies do not necessarily guarantee teachers' classroom practices. There are no detailed guidelines regarding how and to what extent university EFL teachers should integrate technology into their classrooms. Thus, teachers have the autonomy to decide when and how to use technology (Li & Ni, 2011).

Previous research shows that university EFL teachers do not integrate technology to the level promoted by the MOE and that their approach lacks innovation and creativity. For example, the most frequent technology integrations are with traditional technologies such as editing text in *Microsoft Word*, presenting information with *PowerPoint*, and sharing course materials on learning management systems (Li, 2014; Li & Walsh, 2011; Liang, 2021). Previous research also shows that teachers mostly use technology for teacher-centered purposes (e.g., preparing teaching materials) rather than student-centered purposes (e.g., creating a communicative language learning environment), as advocated by the MOE (Li et al., 2019; Liang, 2021).

Therefore, a gap exists between policy requirements and teachers' actual practices. This is primarily attributed to inadequate pedagogical and technological training and insufficient technical support (Hu & McGrath, 2011; Yan et al., 2012; Zhou et al., 2011). Despite the consensus among teachers that technology benefits teaching and learning, it is not used to the optimal level or the expected degree (Golonka et al., 2014).

Thus, this study examines in-service university EFL teachers' perceptions of technology integration and their previous challenges with technology integration. In this study, an in-service teacher refers to a teacher who has a government-issued teaching certification and is currently teaching independently in the classroom. In contrast, a preservice teacher is in the process of guided or supervised teaching by a mentor or cooperating teacher. Information from this study provides insights for policymakers regarding how better to support in-service university EFL teachers in the future. The research questions are: (1) What are in-service EFL teachers' perceptions of what constitutes technology integration and what do they perceive as effective technology integration? (2) What challenges did they encounter regarding technology integration in EFL classrooms?

Literature review

Extended technology acceptance model

Teo's (2010) extended technology acceptance model (TAM) expanded Davis et al.'s (1989) TAM by adding subjective norm (SN), facilitating conditions (FC), and technological complexity (TC) as external variables. It was initially used to investigate preservice teachers' attitudes toward computer use (ATCU).

Following the original TAM, Teo's (2010) study showed that perceived usefulness (PU), defined by Davis (1989) as "the degree to which a person believes that using a particular system would enhance his or her job performance" (p. 320), was the key determinant of preservice teachers' attitudes toward computer use. Teo also found that perceived ease of use (PEU), defined by Davis (1989) as "the degree to which a person believes that using a particular system would be free of effort" (p. 320), had a significant impact on both *perceived usefulness* and ATCU. As depicted in Figure 1, perceived usefulness and PEU are two crucial variables that affect preservice teachers' ATCU.

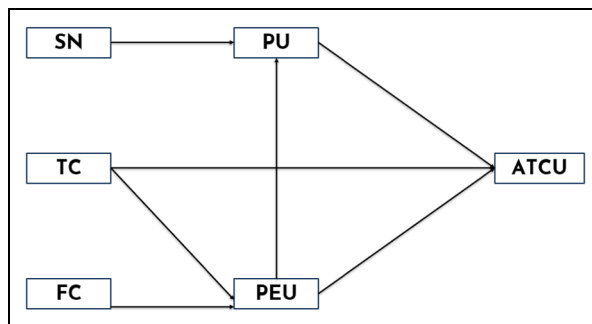


Figure 1. Extended TAM (Teo, 2010).

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Moreover, Teo's (2010) results indicate that SN, FC, and TC are important external factors that predict preservice teachers' ATCU. A *subjective norm* is "a person's perception that significant others think he should or should not perform the behavior in question" (Fishbein & Ajzen, 1975, p. 302). In terms of technology acceptance, Venkatesh and Davis (2000) propose that a person's acceptance of technology may be encouraged by their coworkers. As depicted in Figure 1, *SN* significantly influence *perceived usefulness* and, in turn, influence ATCU. *FC* are environmental factors that impact a person's desire to perform tasks (Teo, 2010). *FC* significantly influence PEU, affecting ATCU. Furthermore, this study indicates that *TC*, which refers to the degree to which a system is perceived to be relatively difficult to understand and use (Thompson et al., 1991), significantly affects PEU and ATCU (Teo, 2010).

Teacher value beliefs

The TAM has been widely used to predict technology usage in educational settings (Legris et al., 2003). However, this model does not include teacher value beliefs (TVB), which are critical factors in the success of technology integration. *Teacher beliefs* are defined broadly as "tacit, often unconsciously held assumptions about students, classrooms, and the academic material to be taught" (Kagan, 1992, p. 65). Value beliefs include the perceived significance of particular goals and choices (Anderson & Maninger, 2007). *Teachers value beliefs* about technology are based on whether or not they think technology can assist them in achieving their instructional goals (Watson, 2006).

Ottenbreit-Leftwich et al. (2010) opines that teachers adopt technology in their classrooms for two main reasons: (1) to address their professional needs and (2) to address student needs. First, technology can address teachers' professional needs by improving their classroom operations and management efficiency while enabling them to create customized teaching materials. In addition, teachers perceive technology as supporting their professional development by enabling them to acquire new teaching ideas and resources, and communicate and collaborate with other experts and colleagues (Ottenbreit-Leftwich et al., 2010). Second, technology adoption can enhance student motivation and engagement while supporting their skills in comprehension, higher-order thinking, and technology (Ottenbreit-Leftwich et al., 2010). Furthermore, addressing teachers' professional needs and enhancing their classroom teaching practices will eventually benefit students.

Therefore, this study expands Teo's (2010) TAM to include *teacher value beliefs associated with using technology* (Ottenbreit-Leftwich et al., 2010) as an additional factor influencing teachers' *perceived usefulness of technology integration*. As depicted in Figure 2, in the integrated model, *TVB*, together with *SN*, influence their *perceived usefulness of technology integration* and, in turn, influence their ATCU. In other words, whether a teacher perceives technology integration as useful depends on whether they believe technology integration will add value to their teaching and their perceptions of how people important to them perceive technology integration.

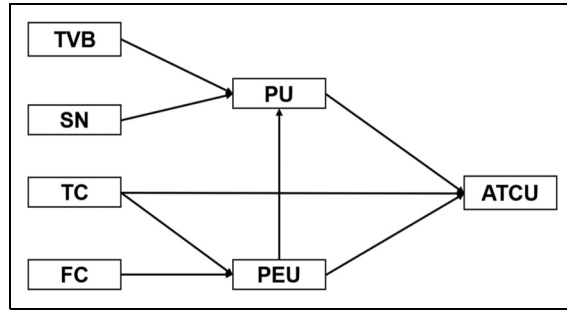


Figure 2. Integrated framework of technology integration.

Research on EFL teachers' technology integration in China

Li (2014) conducted classroom observations and follow-up interviews with eight secondary school EFL teachers in China to investigate how they integrated technology into their English classrooms. The findings show that teachers integrated technology for various pedagogical purposes, including teacher- and learner-centered activities. This study also identified four essential factors affecting teachers' technology use—sociocultural context, beliefs, access to resources, and technology competence and confidence. Teachers' beliefs regarding whether technology benefit students' learning greatly influences whether they fully integrate technology into their teaching practices (Li, 2014).

Based on Teo's (2010) extended TAM, Teo et al. (2018) conducted a quantitative study in five universities in China to investigate factors that affect the intentions of EFL university teachers to use technology in classroom teaching. This study found that *perceived usefulness* predicted attitudes toward technology and behavioral intentions. In addition, PEU significantly predicted *perceived usefulness*. This supports the primary constructs of the original TAM and suggests that TAM can be applied in the Chinese context.

More recently, Liang (2021) used a mixed-method approach to investigate EFL teachers' technology integration at a university in China and found that these teachers generally held positive perceptions of technology integration. However, their practices mostly relied on traditional technologies (e.g., *Microsoft Word* and *PowerPoint*) to deliver and present information. New and emerging technologies (e.g., *Moodle* and *WeChat*) are generally used for logistics and social purposes. This study also reveals that teachers primarily used technology for teacher-centered purposes rather than to enhance student engagement. However, this study does not fully explain why teachers rarely integrate technology for student-centered purposes (i.e., by examining teacher value beliefs associated with using technology).

Although both quantitative and qualitative studies of teachers' technology integration have been identified in previous research, Granic and Marangunic's (2019) systematic literature review on

TAM in the educational context shows that 83% of the previous research investigated university students, whereas only 17% investigated other participants (e.g., high school students, teachers, and employees). Although attention in China has been drawn to EFL teachers in the last decade, most literature is within the K-12 context (Li, 2014; Li & Ni, 2011; Li & Walsh, 2011; Li et al., 2019). Among the literature investigating university EFL teachers' technology integration in China, the focus has been on preservice teachers (Sang et al., 2011; Teo et al., 2018). In-service university teachers are often neglected. However, in-service training is immediately relevant to the teachers and their current instructional setting: the classroom and the students (Hubbard, 2008).

Thus, this study investigates in-service university EFL teachers' perceptions of technology integration, the factors that may influence their technology integration, and the challenges they have encountered. This study also aims to identify how universities, governmental institutions, and teacher educators can better support in-service teachers' future technology integration.

Methodology

Research context and participants

This study is a multiple-case study conducted at a private university in southeast China with an enrollment of approximately 20,000 undergraduate students by 2021. In China, a private university refers to a higher education institution that does not receive public funding and grants a diploma in higher education after 3 years of full-time study or a bachelor's degree after 4 years of full-time study (Liu, 2018).

This study used purposeful sampling methods to access knowledgeable people who possess in-depth knowledge about specific issues, owing to their professional roles, power, access to networks, expertise, or experience (Ball, 1990). The term *knowledgeable people* refers to in-service EFL teachers who teach EFL and have experience in integrating technology in their classrooms. *A case* refers to a single in-service EFL teacher. The College English Teaching Center participants were selected for the following reasons: First, the College English Teaching Center has a large student base as the center is responsible for providing compulsory and elective English courses to all non-English-major undergraduates from year 1 to year 3. Second, the faculty dean actively promotes technology integration, and the College English Teaching Center teachers demonstrate comparatively higher degrees of technology integration in the classroom. Third, the researcher sought a diverse sample that included experienced and novice teachers (i.e., those with less than 3 years of full-time teaching experience) and both English for General Purposes (EGP) and English for Specific Purposes (ESP) teachers. The center is responsible for teaching both EGP and ESP courses.

The researcher contacted potential participants through personal contacts within the department. Among the in-service teachers who expressed interest in participating, the researcher selected seven

who met the following criteria: (1) have used technology in their classroom teaching, and (2) have received relevant training regarding technology integration. One supervisor of these in-service teachers also participated in the study. The researcher assigned pseudonyms to each participant. As shown in Table 1, the in-service teacher participants had an average of 5 years of teaching experience. Two participants were male, and the other five were female. The supervisor was also an English teacher with over 10 years of teaching experience.

Data collection

Invitations were sent to the participants via the social networking tools *WeChat* and *QQ*. An information sheet introducing the purpose and procedures of this research was shared with the participants along with a consent form. Written informed consent was obtained from all the participants in this study. The following data were collected from each of the seven in-service teacher participants: (1) informal conversation data, (2) course syllabi, and (3) interview data (initial and, in some cases, follow-up). Moreover, a sample class evaluation form for evaluating in-service teachers' classes and interview data were collected from the in-service EFL teachers' supervisor.

Before the interview, the researcher initiated informal conversations with the participants on WeChat and QQ to gather broad information (e.g., What was on your mind when you first thought of technology integration in the EFL classroom?) These interactions initially generated an understanding of the teachers' technology integration practices. The informal conversations allowed the researcher to build rapport with the participants and identify relevant and meaningful interview themes—broad topics to include in the interviews—the interests and concerns of the teachers and shared interests between the researcher and the in-service teachers. The researcher conducted informal conversations on WeChat and QQ using text and audio messages and video/audio calls based on each participant's preference.

The researcher also collected course syllabi from the in-service teachers and a sample class evaluation form from the supervisor before the interviews. Although the supervisor could not reveal the evaluation results for each teacher, a sample class evaluation form provided information about the criteria used to evaluate in-service teachers' performances. For example, "flexible and effective teaching method, inspiring students to think, and interaction between teachers and students" is one of the main evaluation criteria and accounts for 20% of the evaluation score. Combined, this information provided a general understanding of the courses taught by the in-service teachers in the study and the evaluation criteria for in-service teachers at the focal university.

The researcher then conducted semi-structured one-on-one interviews via *Tencent Meeting*, each lasting 40–90 min. The researcher recorded the audio and video of the meetings. Interview protocols (in both English and Chinese) were sent to the participants 1 week before the interview to give

Table 1. Demographic information of participants.

In-service teacher's (T)/ Supervisor's (S) name (pseudonym)	Teaching experience (years)	Advanced degree	Major(s)	Students' English proficiency level(s)	Course(s) taught	Participation in training in technology integration
Yuan (T)	6	Postgraduate	English Education	Lower intermediate; Intermediate	College English; Business English; English for Music	Yes
Shen (T)	13	Postgraduate	Applied English Linguistics	Lower intermediate	College English	Yes
Wen (T)	3	Postgraduate	English Literature	Intermediate	College English; Computer English	Yes
Hu (T)	4	Postgraduate	English-Chinese Interpreting	Lower intermediate; Upper intermediate	IELTS; Translation & Interpreting;	Yes
Liu (T)	5	Postgraduate	English	Lower intermediate	College English	Yes
Tan (T)	2	Postgraduate	Applied English Linguistics	Lower intermediate	College English	Yes
Wang (T)	3	Postgraduate	Applied English Linguistics	Lower intermediate; Intermediate	College English; Business English	Yes
Zhang (S)	13	Postgraduate	English Literature	Intermediate	College English; Medical English	Yes

them time to recall and reflect on their previous teaching experiences. Interviews were all conducted in the participants' first language (Chinese).

Based on the proposed integrated TAM, the interview questions included several essential themes with open-ended questions (see Appendix 1): (a) perception of (meaningful) technology integration, (b) pedagogical goals and learning outcomes, (c) technology integration practices, (d) perceived benefits and drawbacks of technology integration; (e) environment and conditions, and (f) future needs and support. The researcher deliberately referred to some phrases (e.g., technology integration) in English during the interviews to avoid any loss of meaning during the translation process. For example, when asked about the participants' understanding of technology integration, the original utterance was: “你是如何理解 *technology integration in the EFL classroom*?” (*What is your perception of technology integration in the EFL classroom?*).

The researcher conducted follow-up interviews after the researcher started the data analysis process. Each lasted approximately 30 min. The aim of the follow-up interviews was two-fold: (1) to clarify ambiguity in the previous interviews and to confirm the researcher's interpretation and (2) to expand on some interesting points identified by the researcher in the data analysis and to generate new insights. When the researcher felt that relevant information was missing or not thoroughly discussed in the previous interviews, it was explored in the follow-up interviews. Additionally, participants talked to the researcher on *WeChat* or *QQ* to share further information or reflections after the previous interviews. The whole interview process lasted for 1 month.

In addition to interviewing the teacher participants, the researcher invited a supervisor to share her perceptions and opinions regarding technology integration in the EFL classrooms. The supervisor was appointed by the university to observe the in-service EFL teachers' classroom teaching, evaluate their performance, and provide suggestions. The supervisor randomly selects two lectures from each in-service teacher's class each semester to conduct classroom observations. Due to the Covid-19 pandemic and the difficulty of the researcher conducting on-site class observations, the interview with the supervisor allowed the researcher to gain a better understanding of the in-class technology integration practices. The interview questions for the supervisor (see Appendix 2) were adapted to focus mainly on the observed classroom practices of the in-service teachers' technology integration and students' reactions. The sample interview questions included: (1) “What are the teachers' common technology integration practices?” (2) “Which aspects do you think the teachers have done well, and which aspects can be improved?” (3) “Were the students actively engaged in the in-class activities published on the classroom management tool?”

Data analysis

The initial round. The course syllabi and data collected from informal conversations with each participant were organized in a separate case folder for analysis. The initial round of data analysis

included transcribing audio texts from *WeChat* and *QQ* and audio/video call recordings of the informal conversations. Then, the researcher conducted individual case analyses and cross-comparisons among multiple cases. A sample course evaluation form provided by the supervisor was included in the cross-comparison stage. As meaningful information extracted from the aforementioned resources can help form the interview protocol, the initial round of data analysis was conducted before the interview protocol was drafted.

The main round. The main round of the data analysis process included interviews with in-service EFL teachers and the supervisor. Two phases were included in this round: (1) analysis of the individual cases and (2) cross-comparisons between multiple cases. Phase one followed Leavy's (2017) five-step data analysis process. First, the recording was transcribed verbatim by an online tool and checked word by word by the researcher. Only excerpts from the transcripts included in this study were translated by the researcher. The transcripts were double-checked by a certified English-Chinese translator. Second, the researcher immersed herself in the data to develop initial ideas. The researcher read the interview data line by line multiple times and assigned labels to each observation that might inform the research questions. Third, the researcher conducted analytic coding manually. The researcher read the transcripts multiple times, developed codes, and revised the codes as needed. Similar codes were categorized into provisional themes. For example, frequently appearing codes such as "language learning platforms/apps" and "online mini-lectures" were grouped into a provisional theme named "complementary learning resources," and later combined with other themes (e.g., "student motivation") to form a larger theme "use of technology for student needs." Similarly, "efficient in classroom management" and "easy to grade the assignments and provide feedback" were grouped into a provisional theme named "effectiveness and efficiency of technological tools" and later combined with other provisional themes (e.g., "use of technology for preparing teaching material") to form a larger theme named "use of technology for professional needs." Subsequently, the themes and sub-themes were contrasted and integrated by referring to the technology integration framework to generate the major themes. Finally, the researcher sought links between categories, concepts, and themes and developed the meaning of the coded data (Leavy, 2017). The analysis and interpretation process is recursive, with analysis leading to interpretation and interpretation leading to analysis (Leavy, 2017). The researcher followed the same steps to analyze all cases and clarified any ambiguities with participants by conducting follow-up interviews.

In Phase Two, the constant comparative analysis method was used (Merriam, 1998) to compare all the cases and find codes, categories, and patterns that transcended individual cases (Stake, 2006). Re-occurring codes and themes were noted, and after careful comparisons, they were grouped into the same theme or larger themes were formed. Interview data from the supervisor and in-service

teachers were analyzed together. The data collected from the in-service teachers revealed their perceptions of technology integration and the challenges they encountered. The supervisor's perceptions and evaluations could enhance trustworthiness (Merriam, 1998) of the interview data from the in-service teachers and to depict a fuller picture of in-service teachers' technology integration practices. Combining the two data sources provides a holistic understanding of teachers' technology integration practices because the supervisor is experienced in teaching, monitoring, and evaluating EFL classes.

After the cross-case themes were developed, the researcher classified the themes into two categories: (1) themes that corresponded to RQ1 and (2) themes that corresponded to RQ2. The researcher triangulated the in-service teachers' main interview findings with additional data sources, including informal conversations, the sample course evaluation form, course syllabi, and interviews with the supervisor (Merriam, 1998). Finally, the researcher translated the relevant interview excerpts into English.

Research findings

The in-service teachers' perceptions of technology integration were evident in how they used technology to address their professional and student needs. In-service teachers also mentioned the challenges that they have encountered in their technology integration (e.g., financial constraints). The findings also suggest that further training is essential for in-service EFL teachers.

Perceptions of technology integration

Use of technology for professional needs. All in-service teacher participants mentioned that they frequently integrated technology into their classrooms. They perceived effective technology integration as a way of addressing their professional and student needs. They often used various online platforms to prepare teaching materials, such as search engines, *Wikipedia*, automated evaluation websites (e.g., *Grammarly*), news websites (e.g., *BBC News*), and video or audio resources (e.g., video clips, BBC documentaries, and *TED talks*). Moreover, teachers used multiple technology tools to deliver course content in the classroom, such as desktop computers, projectors, *Microsoft Word*, and *Microsoft PowerPoint*. Furthermore, they frequently used learning management systems for classroom management. For example, all participants used *Xue Xi Tong* (a learning management application) to improve classroom management efficiency for tasks such as marking attendance, setting assignments, forming groups, and reviewing homework.

Perceived usefulness was a significant factor influencing teachers' technology integration. Teachers used technology to prepare teaching materials, deliver course content, and manage

classes because they perceived that technology integration would enhance their teaching effectiveness and efficiency. Teo's (2010) study found that preservice teachers' PEU significantly affected their perceived usefulness and ATCU. In contrast, this study found that PEU did not significantly influence teachers' technology integration practices. This study suggests that in-service teachers' technology integration is not affected by their perceptions of how much effort they need to devote to technology use. This might be attributable to the different characteristics of the participants in the two: preservice teachers in Teo's (2010) study and in-service teachers in this study. Compared to preservice teachers, in-service teachers were more focused on the perceived benefits that technology would bring to teaching, rather than on whether it was easy to use the technology (Li, 2014).

Use of technology for student needs. Another reason for teachers' technology adoption was that it could benefit students. For example, it could enable increased and equal class participation opportunities, provide a vivid visual representation of complicated concepts, and give instant feedback for online quizzes. Liu mentioned that she encouraged students who were too shy to raise their hands during classroom discussions to type their answers into *Xue Xi Tong*. Wang shared her experience of using online videos in her Business English class to help students better understand how business negotiations were conducted.

In addition to in-class teaching, teachers' technology integration also included teacher-directed students' use of technology outside the classroom. MOOCs, mini-lectures, video or audio resources, language learning apps, and automated evaluation websites were recommended to enrich students' language learning resources and improve their language proficiency. For example, Hu recommended that his students use the computerized writing evaluation website, *Grammarly*, to check grammar and spelling and to provide word choices and other writing suggestions. Notably, *TVB* also influenced teachers' technology integration practices. Tan explicitly mentioned that she perceived effective technology integration as contributing to her pedagogical goals:

Effective technology integration should help to achieve pedagogical goals and contribute to student learning. It does not simply mean using technology to distribute questionnaires or enrich classroom interaction forms. Whether technology integration is effective depends on its pedagogical effects and impacts on teaching. (Tan)

Conversely, as technology integration requires so much work, if the teachers do not truly believe that technology integration will add value to their class, they will not be motivated to use it. Hu was not motivated to explore new technology tools because he thought it would take too much time without adding much value to his teaching.

Barriers and constraints to technology integration

Financial constraints. Wen and Hu believed that financial constraints limited their technology integration practices and prevented them from fully integrating technology. Wen thought VR classrooms were helpful in teaching, but he did not believe it was practical since it would be too expensive for the schools. Although not explicitly stated, Liu implied that a lack of financial incentives might prevent in-service teachers from further integrating technology.

My friend who works in another school said that his online recorded classes contributed to extra workload, and the workload calculated for an online recorded class (in his school) was higher than a face-to-face class. But as far as I know, our school has not fully adopted the integration of online and offline teaching, so our online work is obligatory. (Liu)

As the teachers anticipated that subsequent financial support would be unavailable, they were unlikely to integrate technology to a great extent.

Contradiction between school policies and practices

All participants mentioned that they were unaware of any specific school policy that mandated technology integration. The course evaluation form provided by the supervisor also indicated that technology integration was not an evaluation criterion for teachers' performances. However, according to the teachers, technology integration was promoted within the faculty. The dean always addressed the importance of technology integration in faculty meetings, and in-service teachers were encouraged to share resources and practices. Inspiration from colleagues was mentioned by the in-service teachers as a significant factor when incorporating technology.

I think some teachers have done it well. Shen extracted vocabulary from a textbook and designed a small online program for students to practice vocabulary learning after class. I think this is very useful and I should learn from them. (Shen)

Following Teo's (2010) study, teachers' technology integration was affected by the SN of the school environment, such as the promotion by the faculty dean and the active engagement of colleagues. This also supports Venkatesh and Davis's (2000) argument that when a coworker thinks the system is useful, another person in the organization will follow the same idea.

Students are also perceived as "significant others" who affect the SN of the school environment and in turn, influence teachers' technology integration. Yuan used the "hand-raising" function of *Xue Xi Tong* to randomly pick students who "raised [their] hands" by clicking the "raising hand" icon on *Xue Xi Tong*. This function helped Yuan select students who raised their hands first to avoid being perceived as favoring some students over others.

Despite the initial encouragement and motivation to integrate technology, Liu and Tan also shared the challenges they encountered with technology integration:

This semester, the school issued an “in-class mobile phone prohibition” policy. This creates a dilemma for teachers. According to this policy, students are permitted to use mobile phones in class for learning purposes; however, their overall use should be reduced. It is difficult to determine whether technological integration is encouraged in the classroom. (Tan)

When applying for the implementation of blended teaching in my class, the leaders and supervisors of the Education Administration Department were worried about the quality control of online instruction. I submitted several rounds of applications for this work. (Liu)

School administrative support was rated as an essential factor influencing technology adoption in teaching (Groves & Zemel, 2000). In this study, the school administration was not fully prepared to support large-scale technology integration. On the one hand, the school and faculty promoted technology integration, especially the use of the prescribed learning management application *Xue Xi Tong*. On the other hand, the newly-issued school policy aimed to reduce in-class use of mobile phones. These contradictions gave teachers a dilemma and impeded their technology integration.

Moreover, *TVB* influenced their technology integration even when barriers existed. When teachers saw value in using technology for specific educational purposes, they were more likely to use technology despite the obstacles (Snoeyink & Ertmer, 2001–2002). Liu believed that a blended learning model would better motivate her senior students. Although the school administration questioned her blended learning proposal, she applied it multiple times and persuaded the school administration to adopt it.

Difficulty in finding suitable teaching material

Most teachers in this study mentioned difficulty with finding suitable teaching materials as a significant challenge. Yuan discussed the problem of accessing authentic language learning materials online:

Another difficulty in finding suitable teaching materials is the mismatch among online resources, student proficiency levels, and pedagogy. It was difficult to locate online resources that fit the topic of the teaching unit and matched the students’ proficiency levels. (Yuan)

Furthermore, many of the authentic English learning materials may not be accessible, as they are from foreign websites. Shen and Wen also discussed the scattered nature of online resources and expressed their desire for an integrated resource platform.

Demand for future training

Teachers requested training as a facilitating condition. Four teachers favored training provided by faculty members, one teacher preferred training provided by technological experts, and two teachers, Yuan and Wang, explicitly expressed the need for training that connected technology with pedagogy.

I may be more inclined to communicate and share information with faculty members. Since teachers (from our faculty) teach similar courses to students with similar proficiency levels, we might have encountered similar problems. (Yuan)

Technology integration should be considered in the lesson planning stage to ensure that technology is meaningfully integrated into the lessons in order to facilitate student learning. Simply using technological tools in class does not involve technology integration. (Wang)

Liu emphasized the importance of connecting technology and pedagogy. She wondered how technology could better serve teaching and stressed that technology should not be integrated only for the sake of technology integration. In contrast to the other teacher participants, Wen taught an ESP course (Computer English). Without an educational background in Computer Science, Wen mentioned that he mainly acquired knowledge through online searches and self-learning. As Computer English is closely related to computers and technology, and requires a more advanced level of technology integration, he preferred inviting experts from the School of Computer Science to provide training.

The in-service teachers' responses echoed the supervisor's comment that deeper levels of technology integration are needed, especially when teachers are preparing lessons. They need to thoroughly consider how technology can be integrated into lessons, to make teaching more effective and student learning more beneficial. Although most teachers have a clear vision and understanding of technology integration, a more systematic way of integrating technology with pedagogy is required.

Discussion

In accordance with Teo's (2010) extended TAM, *perceived usefulness* is the primary factor influencing teachers' technology integration in this study. Based on Teo's (2010) extended TAM, the effect of *perceived usefulness* on ATCU arises from the influence of *SN* and *PEU*. Encouragement from the faculty dean and inspiration from colleagues significantly influenced teachers' *perceived usefulness of technology* and, in turn, influenced their *attitudes toward technology integration* and teaching practices.

Another explanation for why *SN* influence teachers' technology integration is the collectivist Chinese culture. China is a highly collectivist society, in which people are integrated into strong and cohesive groups (Hofstede, 2001). Chinese people have a strong "we" consciousness and emphasize belonging and harmony (Hofstede, 2001). In a society where the expectations of others and the

recognition of leaders are highly valued, support and recognition from leaders and colleagues are vital (Li, 2014). Teachers in this study valued group norms, and their technology integration decisions were influenced by the most “significant others” at work: the faculty dean and their colleagues.

This study also indicates that *TVB* are closely related to *perceived usefulness*. Perceived usefulness refers to teachers’ beliefs that technology integration enhances their teaching, whereas *TVB* emphasize the needs of both the teachers and the students. As indicated by Ottenbreit-Leftwich et al. (2010), *TVB* were evident in how they used technology to address both professional and student needs. Improving teaching effectiveness and efficiency will ultimately benefit the students.

Unlike the preservice teachers in Teo’s (2010) study, the teachers in this study did not mention *PEU* and *TC* as influential factors. This could be because, as conscientious and responsible teachers, they focused on enhancing teaching performance and addressing student needs. They might still be willing to integrate technology that they perceive as not easy to learn and operate. Also, since the participants in this study are all in-service teachers with at least 2 years of teaching experience, they were confident and familiar with the technology that was related to their daily teaching. Therefore, they might not find the *PEU* of a specific technology particularly influential in their teaching. Similarly, *TC* was not mentioned by the teachers as a significant factor in technology integration.

The *FC* mentioned in this study primarily comprise financial resources, training, and administrative support. Hu and Liu were unable to further integrate technology because of financial constraints and a lack of financial incentives. Training was an essential aspect required by all the teachers. They all believed that training would contribute to their future technology integration and teaching performance. *TVB* also influenced teachers’ training needs. Liu emphasized the importance of connecting technology with pedagogy in training. She stressed that technology should not be integrated simply for the sake of technology integration. Rather, Liu’s belief that technology integration should serve pedagogical purposes influenced her training requirements. Liu mentioned that she did not want to receive general technological skills training because she already had those skills. Rather, she sought training that catered specifically to EFL classrooms; for example, how teachers can utilize technological tools to help students practice vocabulary.

TVB can facilitate teachers’ technology integration despite the lack of *FC*. Although the school administration questioned Liu’s proposed blended teaching mode, she insisted on adopting it because she believed it would benefit her students. Despite the lack of *FC* (e.g., administrative support), *TVB* contributed to teachers’ technology integration.

In conclusion, this study explored in-service teachers’ perceptions of what constitutes technology integration and the challenges or barriers they have encountered regarding technology integration in EFL classrooms. The teachers considered that effective technology integration should address both their professional and student needs. Building on Teo’s (2010) extended TAM and the theory of teacher value beliefs associated with using technology (Ottenbreit-Leftwich et al., 2010), the findings

demonstrated that perceived usefulness, TVB, SN, FC, and cultural values jointly influenced teachers' technology integration. Although not included in the extended TAM, TVB and cultural values were related to the variables of the extended TAM because (1) TVB were related to the perceived usefulness of technology integration and (2) values of the collectivist culture were closely related to SN. Altogether, these variables explain in-service teachers' technology integration practices.

Limitations of the study

Although this study provides useful insights, it has several limitations. First, it was a small-scale case study, so the research results and implications may not be generalizable to larger contexts. Moreover, this research was conducted at one private university in Southeast China and may not represent the situation in other parts of China. Future studies should include a broader range of universities in terms of tiers and geographical regions.

Further, although the researcher regularly communicated with the participants on *WeChat* or *QQ* to gain further insights and conducted follow-up interviews to confirm and clarify information, the researcher could not conduct classroom observations due to the Covid-19 pandemic. Future researchers may consider including additional sources of data (e.g., classroom observations) to gain a more holistic understanding of teachers' technology integration and longitudinal data to examine changes in teachers' perceptions. In addition, focus group interviews can be incorporated along with one-on-one interviews to stimulate more ideas through discussion among participants.

Implications of the study

This study adds value to the limited research on the technological integration of in-service university EFL teachers in China. The findings contribute to the existing literature by integrating Teo's (2010) extended TAM with Ottenbreit-Leftwich et al.'s (2010) theory of teacher value beliefs associated with using technology and increases the applicability of the extended TAM in China. By providing insights into teachers' perceptions of technology integration and classroom practices, this study encourages school-level, local, and national educational policy groups to formulate specific standards of technology integration and to provide guidance on how to implement these standards. This study also aims to help universities, government institutions, and teacher educators better understand the needs of in-service EFL university teachers and to provide support for their future technology integration.

Declaration of conflicting interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.


Ethical statement

The research was carried out in accordance with the ethical guidelines of the Chinese University of Hong Kong of which the author was a postgraduate student when the research data was collected. Informed consent was obtained from all the participants.

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Appendix 1: Interview Protocol for Teachers

1. Demographic & background information

- Gender; educational background; teaching experience
- Courses taught; students' English proficiency levels
- Training experience in technology integration

2. Interview Questions

(a) Perception of technology integration

- What is your perception of (meaningful) technology integration? (e.g., What does it include?)
- To what extent do you think technology integration is useful for EFL teaching?

(b) Pedagogical goals and learning outcomes

- What are the pedagogical goals of your courses?
- Do you think technology integration helps you achieve these goals?

(c) Technology integration practices

- How do you integrate technology into your teaching?
- Are you satisfied with your current technology integration practices?

(d) Perceived benefits and drawbacks of technology integration

- What benefits do you think technology integration has brought to your classroom? Any drawbacks of technology integration?
- Do you encounter any barriers or constraints with technology integration?

(e) Environment and conditions

- Network and equipment;
- Financial, administrative, technical, and training support
- School policy; institutional culture; attitudes of school management

(f) Future needs and support

- Have you received enough support for technology integration from your school?
- What kind(s) of support do you expect (technical, pedagogical, financial, or administrative)?

Appendix 2: Interview Protocol for Supervisor

1. Demographic & background information

- Gender; educational background; teaching experience; courses taught; students' English proficiency levels; training experience in technology integration

2. Interview questions**(a) Teachers' performances**

- What is your perception of (meaningful) technology integration? (e.g., What does it include?)
- What types of technology are integrated by the teachers?
- Do the teachers' practices of technology integration contribute to teaching?

(b) Students' reactions

- What are the students' reactions to technology integration?

(c) Comments and evaluations

- Do you think the teachers' technology integration contributes to teaching and student learning?
- What have the teachers done well and what can be improved?