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The Challenges and Factors Influencing ICT Integration for EFL Teachers in China: A Systematic Review

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Abstract. The advantages of using information and communication technology (ICT) in English as a Foreign Language (EFL) teaching and learning have been well documented in research studies. The international trend and Chinese national policies on education both call for EFL teachers to effectively integrate ICT into their teaching. However, only a few studies have explored the challenges of ICT integration into EFL teaching, especially in China. This study draws data from four databases based on the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) 2020 checklist to ensure a comprehensive and rigorous analysis of the available literature. By synthesising and analysing the findings from the final selected 17 articles between 2019 and 2022, this study highlighted the research designs of the relevant studies on the use of ICT by EFL teachers in China, along with the two most important underlying theories (TPACK and TAM) associated with ICT integration. It also provides insights into the specific challenges and influencing factors that impact ICT integration in EFL teaching in the Chinese context. The findings reveal that EFL teachers' ICT literacy and acceptance are influenced by many factors which are frequently classified into external and internal ones. The majority of the reviewed studies offered recommendations on how to use technology more effectively, apply ICT in EFL teaching, and create authentic teaching and learning environments. Additionally, the findings of this study offer suggestions for future research and teaching approaches, particularly for overcoming the challenges of ICT integration.

Keywords: ICT integration; factors; underpinning theory; EFL teacher; China

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1. Introduction

Big data, 5G, and artificial intelligence's explosive growth are fundamentally altering the market for talent, which is why China's education information age is fostering talent development, educational services, and educational governance (Yan & Yang, 2021). The world has undergone a digital transition, causing knowledge and skill gaps in new acquisitions that the future workforce and the educators preparing it must address. Clarifying the current state of teachers' teaching competency is necessary to address the demands of in-service teachers, trainers, and college leaders who want to increase their professional learning and development (Diao & Hu, 2022). English is a compulsory subject for freshmen and sophomores who are not majoring in English. On top of that, college students are required to take College English (MOE (People's Republic of China, 2001), which is created specifically to create comprehensive human capital capable of overcoming any challenge, whether it be local, national, or global, and to generate a highly skilled labour force to meet the needs of the nation in the job market. Owing to China's expanding influence in the contemporary globalised period, employers, both domestically and internationally, are looking for graduates with effective communication abilities in at least one other language to enhance their specialised expertise and abilities (Ai et al., 2020).

In order to prepare students for the future workforce's continuously changing expectations, teachers primarily aim to use technology in the educational setting (Farrell & Hamed, 2017). Information and communication technology (ICT) in EFL teaching around the world is not isolated from the issues surrounding the discussions of ICT integration, and it can be discussed in terms of three main aspects: students, teachers, and the technology itself (Kulavuz-Onal, 2018). Although the need to maximise ICT use is widely acknowledged in China, previous research revealed the issue of teachers' insufficient use of technology integration (Chen et al., 2012; Huang et al., 2019, 2022). Finding the factors and barriers preventing language teachers from integrating technology into their teaching has been the key research emphasis.

One major barrier to ICT integration that has been noted is the lack of teachers' technological, pedagogical, and content knowledge (TPACK) (Blackwell *et al.*, 2016; Koh & Chai, 2016). According to Mishra and Koehler (2006), TPACK is frequently used to explain how EFL teachers can learn to integrate technology more effectively to contribute to their professional development. For English teachers, technology, pedagogy, and subject-matter knowledge provide a framework for understanding the teaching and learning process (Schmidt et al., 2009).

The Technology Acceptance Model (TAM), which was first published by Davis (1989), is also widely used to explain users' acceptance of a certain technology. The TAM is made up of five components: perceived usefulness, ease of use, attitude, behavioural intention, and actual system use. Despite the fact that the TAM is evolving, the major accepted constructs in the extended TAM, such as attitude, subjective norms, usefulness, perceived usefulness, self-efficacy, and facilitating factors, have remained stable (Mei et al., 2018). In order to understand

technology acceptance and usage in a range of contexts, the latest version of TAM investigates how external influences from cognitive and affective perspectives affect users' internal views and intentions.

The study carried out by Ertmer, Woods, and associates (1999) is an early attempt to identify and classify a variety of factors that influence how teachers integrate ICT in their teaching. Both primary and secondary barriers have been identified in the effectiveness of teachers' ICT integration. One of the main difficulties encountered in the use of first-order ICT relates to variables beyond the teachers' control. These barriers include a lack of resources, inadequate preparation time for classes, insufficient guidance, and the shortage of support for administration and technology, including limited time as well as hardware and software support. Teachers faced second-order obstacles, which were essential to their identity as professionals, which included reluctance to change, personal beliefs about technology, pedagogy, and instructional practices in the classroom, in contrast to first-order barriers. The studies by Ertmer et al. (2012), and Huang et al. (2021) investigate teachers' attitudes about how they learn and teach, their perceptions about their own efficacy, and the extent to which they are familiar with integrating technology in the classroom. Tsai and Chai (2012) propose the notion of "third-order barriers" which refers to the barriers that come up in connection with the instructor's design thinking. The proactive development of knowledge and instructional practices by instructors in response to the growing significance of ICT and its related pedagogical possibilities is addressed by this.

The adoption and use of technologies within pedagogical practices has generally been determined, and it is now generally understood that this is not a problem unique to technology. According to Zhang and Chen (2022), effectively integrating technology in teaching has always been a complicated issue with many interrelated factors. Internal factors, such as the pedagogical beliefs of the teachers and the attitudes toward technology use (Ding et al., 2019; Liu, Lin, & Zhang, 2017; Tondeur et al., 2017), teachers' technology-literacy and competency (Lai et al., 2018; Weng et al., 2018), can have a big impact on how teachers employ technology in the classroom. External factors, such as the ICT training, lack of time, ICT-related policy, infrastructure and so on (Chen et al., 2021; Huang et al., 2019, 2021a, 2022; Jiang, 2022; Liang, 2021; Ma et al., 2022; Sun & Mei, 2022), also have influence on the ICT integration of EFL teachers in China.

The objective of this systematic literature review is to analyse and synthesise research articles on Chinese EFL teachers' ICT integration in China. The published empirical studies from 2019 to 2022 will be presented while maintaining the principles of the PRISMA model as inclusion and exclusion criteria. This study could also provide insights for EFL policymakers, teachers, and educators to maximise the potential influence of ICT integration in China.

2. Significance of the review

Since China's 1978 adoption of the "open-door" policy, English has received more consideration from the government than ever before in today's China context (Coniam, 2014). Owing to the lack of exposure to real-world English-speaking

situations and the possibility for in-person conversations with native English speakers, EFL learners rely heavily on technology to learn authentic English, particularly the speaking and listening skills. The advancement of technology has made it possible to study spoken English in a non-English speaking setting (Liu *et al.*, 2014). For instance, one teacher utilised blended learning by encouraging the students to share images of their language proficiency on the Chinese Application Programme – WeChat (One Mobile Chatting Application in China) group (Yang, 2019). Using technology effectively is always a component of what EFL teachers know how to do effectively.

The development of teachers' professional, creative, and information literacy competencies is emphasised in the 2019 publication "China's Education Modernization 2035" by the Ministry of Education (MOE) (Huang *et al.*, 2022). Suggestions have also been made to encourage EFL teachers to use technology to create a linguistically rich environment for a Chinese-speaking students. A document titled "Guidelines on College English Teaching" was released by the MOE in 2020 with the purpose of improving the efficiency with which EFL teachers make use of technology. These national documents highlight the use of numerous modern ICT tools, such as multimedia, big data, virtual reality, and artificial intelligence in the field of language teaching and learning. Therefore, EFL teachers are required to adjust to the modern information and communication technology (ICT) landscape, improve their proficiency with using cutting-edge technology, effectively utilise technological advances techniques to access a wider range of instructional materials, foster a broad environment for language acquisition, and increase their efficacy in their teaching endeavours (Zhang & Chen, 2022).

3. Research Questions

To fill in the literature gap, the research questions for this systematic literature review were formed as follows:

1. What are the types of research designs and the target groups in ICT integration in Chinese schools?
2. What are the underpinning theories and influencing factors on EFL teachers' ICT integration in China?
3. What is the classification of the ICT integration challenges or barriers to EFL teachers' ICT integration in China?

4. Materials and Methods

It was essential to examine academic publications in order to comprehend the trends in specific study fields and topics. As stated by Al-Emran *et al.* (2018), reviewing studies can provide comprehensive knowledge based on earlier research and address the consequences of the findings. To conduct this systematic review, the current study utilised the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) 2020 checklist. The checklist has 27 criteria and provides justification and examples for each item so that reviewers can determine whether the findings are appropriate and what should be contained in systematic reviews (Page *et al.*, 2021; Sarkis-Onofre *et al.*, 2021). The four stages

that were employed by the researchers were identification, screening, eligibility, and inclusion, as illustrated in Figure 1.

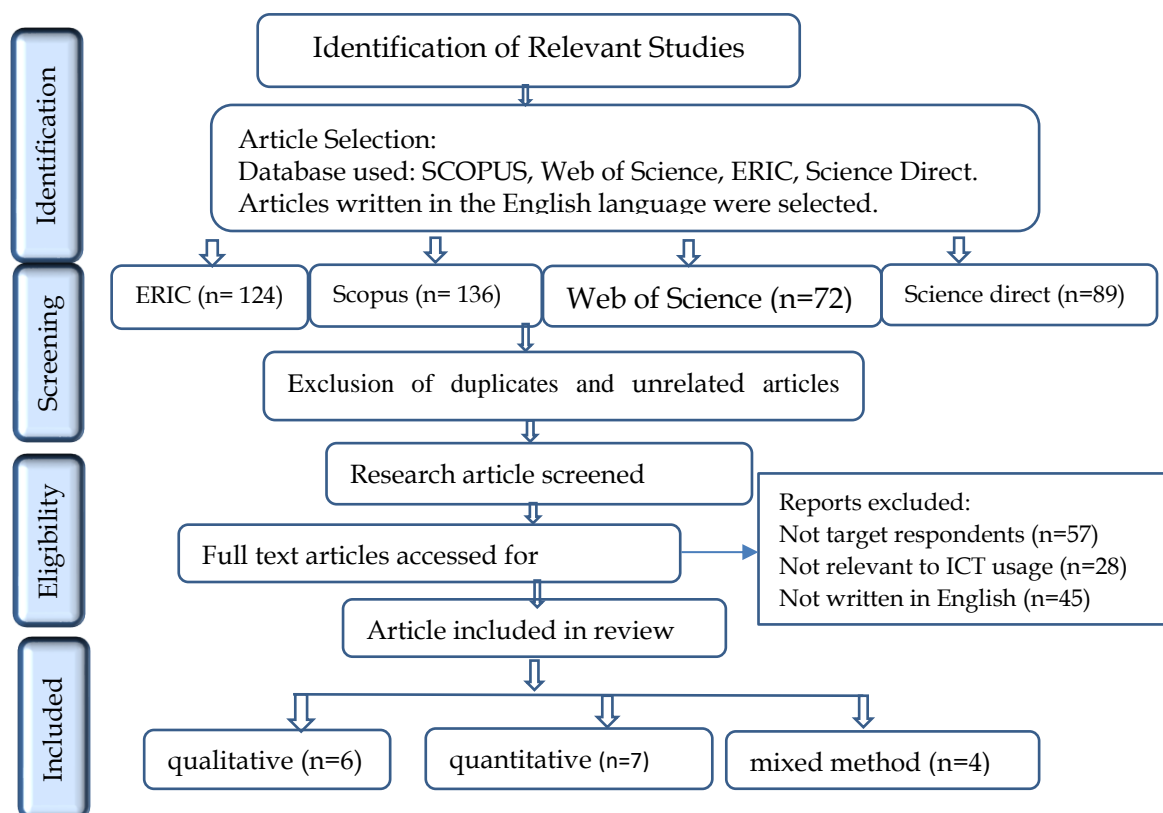


Figure 1. PRISMA Flow Chart for Selecting Process of Articles

4.1 Data collection process

The extraction data form in an Excel spreadsheet was used for manual data collecting. Topics, respondents, study methods, and variables affecting EFL teachers' ICT integration in China were among the data extracted.

Phase I: Identifying Phase

The first step taken by the researchers was to locate relevant research on the subject. In this stage, the researchers selected relevant publications from Web of Science, Scopus, Science direct and ERIC that were published in English between 2019 and 2022. The method used in this process to find the relevant articles, using a combination of keywords, is shown in Table 1. Two different groups of keywords were chosen in order to narrow the search for study articles associated with the influencing factors on ICT integration that Chinese EFL teachers encountered. For a study to be included in this literature review, at least one of its keywords had to be in this study's keywords. The search produced the following results:

("factor" or "barrier" or "challenge") and ("ICT" or "integration" or "technology" or "competency") and ("EFL" or "English" or "teaching" or "language") and ("Chinese" or "China").

The papers collected for this research were organised using the Zotero reference management tool. The method of using a combination of keywords to find the relevant articles is shown in Table 1.

Table 1: Journal Source and Keywords Used to Find Relevant Articles

Journal Source	Relevant articles in Phase I	Screened articles in Phase II	Keywords
Scopus	136	99	“factor” or “barrier” or “challenge”
Web of Science	72	50	“ICT” or “integration” or “technology” or “competency”
Science Direct	89	38	“EFL” or “English” or “teaching” or “language”
ERIC	124	97	“Chinese” or “China”

Phase II: Screening Phase

After eliminating duplicates, the authors reviewed a total of 421 papers that they had collected from the databases mentioned, which they subsequently reduced to 284 articles. In total, 137 papers were screened by their titles and abstracts after records were reviewed, and those articles were removed as being ineligible.

Phase III Eligibility Phase

The review researchers then independently evaluated the full-text versions of potentially relevant papers online to make sure they meet the inclusion criteria listed in Table 2's inclusion section. As a result, 130 studies were excluded after the remaining 147 articles were examined for eligibility.

Phase IV Inclusion Phase

The studies that obviously matched at least one exclusion criterion were removed after assessing the research eligibility. Hence, the number of publications that satisfied the researcher's criteria was reduced to just 17. Book and conference proceedings, as well as book chapters, were excluded based on the exclusion criteria. Additionally, studies that were not released between 2019 and 2022 were excluded. The study's primary objective was to identify what challenges EFL teachers encounter in ICT integration in China, so all reviewed studies had to include ICT integration in Chinese EFL contexts.

Table 2: Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
1. Articles in Chinese EFL contexts	1. Non-Chinese teachers or non-EFL teachers
2. ICT integration related to EFL teachers.	2. ICT integration related to students' achievements.
3. Article published in English.	3. Articles not available or not published in English
4. Published between 2019 and 2022	4. Articles not published between 2019 and 2022

4.2 Quality Assessment

When there is a systematic error or limitation in the study design or conduct, the risk of bias arises, and it will identify the factors that can consistently affect the study's results and findings and report them as being different from the actual conclusion. In this review, each selected article was evaluated individually using the Mixed Methods Appraisal Tool (MMAT) based on the relevant dimensions and criteria of the tool. These aspects included the suitability of the study design, the quality of data collection methods, the accuracy of data analysis, the integration of qualitative and quantitative components (if applicable), and the clarity and validity of the study findings and conclusions. Then, for each study, a record of the assessment findings, stating whether the study met the MMAT criteria for each dimension was produced. Eleven of the evaluated studies were classified as being of above-average quality, while the remaining six were classified as being of below-average quality.

5. Results

For this systematic review, a total of 17 articles on EFL teachers' ICT integration in China from 2019 to 2022 were collected. Chinese EFL contexts were used for all of the articles that were analysed. This section responds to the research questions with a detailed content analysis as well as a description of the study sample.

5.1 Identifying types of research studies on EFL teachers' ICT integration in China

For the first research question, the articles were reviewed with regard to the research designs and the participating EFL teachers in China. The results are detailed in Table 3. Most of the reviewed studies employed quantitative research designs ($n = 7$), followed by qualitative ones ($n = 6$), with mixed-method being used in the remaining four studies. Most of the studies were conducted at colleges and universities ($n=12$) rather than primary or middle schools ($n=5$). It is clear that the EFL teachers' ICT integration competency has received more attention during the past five years.

Table 3: Research Studies on EFL teachers' ICT integration in China

No.	Authors	Research Design	Research Samples/Target Group
1	Bai et al., 2021	Quantitative method with a survey study	156 English teachers from 43 primary schools in Hong Kong.
2	Chen et al., 2022	Qualitative method with a multiple-case study	8 EFL teachers in public university, Southwest China
3	Chen et al., 2021	Qualitative method with a case study	8 EFL teachers in a public primary school, Shanghai
4	Gao et al., 2021	Quantitative method with a survey study	239 Secondary School EFL teachers in China
5	Huang et al., 2022	Mixed-method with surveys and multiple-case interviews	285 Chinese university EFL teachers (6 for interviews)

6	Huang & Teo, 2020	Quantitative method with a survey study	502 English teachers from 30 universities located in 4 urban cities in eastern China.
7	Huang & Teo, 2021	Quantitative method with a survey study	696 English teachers at 59 Chinese universities from 20 provinces
8	Huang et al., 2019	Qualitative method with a case study	14 EFL teachers in Chinese universities
9	Huang et al., 2021	Quantitative method with a survey study	158 teachers in Chinese primary and secondary schools and universities .
10	Jiang, 2022	Qualitative method with a case study	63 EFL teachers in higher vocational colleges in Guangdong, China
11	Li, 2022	Mixed-method with an online survey study	186 high school EFL teachers in China
12	Li et al., 2019	Qualitative method with comparative study	114 classroom videos from 37 primary EFL teachers
13	Liang, 2021	Mixed-method with case studies	35 EFL teachers in a local university
14	Ma et al., 2022	Quantitative method with a survey study	585 EFL teachers in Chinese universities .
15	Sun & Mei, 2022	Quantitative method with a survey study	331 EFL teachers in Chinese universities
16	Zhang & Chen, 2022	Quantitative method with a survey study	261 EFL teachers in Chinese universities
17	Zhang & Fang, 2022	Qualitative method with a case study	12 EFL teachers from a public university

5.2. The underpinning theories and influencing factors on EFL teachers' ICT integration in China

In addressing the second research question, this study expected to identify the underpinning theory that demonstrates the ICT literacy and acceptance of Chinese EFL teachers. The challenges and the influencing factors on the EFL teachers' ICT integration were also explored. The results are detailed in Table 4 following. Two significant theoretical frameworks were adopted in the 17 studies that have been reviewed. The TAM was employed as the underlying theory in ten articles (n=10), and TPACK was adopted in six articles (n=6). Motivational beliefs, ICT learning behaviours, conducive environments, persistence intentions, attitudes towards ICT use, and so on, are some of the influencing factors discussed. Among all the reviewed studies, two frameworks were frequently addressed.

Table 4. Underpinning theory and influencing factors on EFL teachers' ICT integration in China

No.	Authors	Underpinning Theory	Influencing Factors on the EFL teachers' ICT integration
1	Bai et al., 2021	TAM & the Value-Expectancy Theory	Motivational beliefs, ICT learning behaviours, facilitating conditions, continuance intention, and perceptions towards ICT use.
2	Chen et al., 2022	TPACK	Unfamiliar technology, online teaching resources, theoretical ideas, lack of time and energy, and practical English teaching.
3	Chen et al., 2021	TAM	Beliefs were shaped by individual-, institutional-, and policy-level external factors.
4	Gao et al., 2021	TAM	Facilitating conditions, subjective norms, and main constructs of TAM – perceived usefulness, perceived ease of use, and attitude, self-efficacy.
5	Huang et al., 2022	TPACK & TAM	Efficacy, teaching beliefs, technical support and training, and time constraints.
6	Huang & Teo, 2020	TAM	Organisational culture, teacher perceptions of the importance of school policy on technology use, perceived usefulness, and attitude towards using technology.
7	Huang & Teo, 2021	TAM	Subjective norm, constructivist teaching belief, perceived importance of policy, computer self-efficacy and voluntariness.
8	Huang et al., 2019	TAM	Facilitating conditions, perceived usefulness, teachers' perceptions, subjective norm, and technology obsession.
9	Huang et al., 2021	TAM	PU, PEU, attitude toward use, behavioural intention, enabling circumstances, technology complexity, and technology anxiety.
10	Jiang, 2022	Grounded Theory	Three key types of teaching intentions: social tradition, contentment with the curricular platform, and school incentive mechanisms.
11	Li, 2022	TAM & TPACK	ICT acceptance and ICT literacy.
12	Li et al., 2019	TPACK	Knowledge of technological pedagogical content, skill in integrating technology, professional support, and the relation between educational technology and the effectiveness of classroom teaching.
13	Liang, 2021		Barriers such as inappropriate educational software, a lack of time, the Great Firewall, problems with the Internet, inconsistent technology equipment in different classes, and a lack of technical and pedagogical training in how to apply technology.
14	Ma et al., 2022	UTAUT	Perceived pedagogical affordance, perceived social affordance, perceived technological affordances, social influence, facilitating conditions.
15	Sun & Mei, 2022	TAM	Technology intention, PU, attitude, self-efficacy, facilitations, and experiences.
16	Zhang & Chen, 2022	TPACK	Three teacher internal factors: TPACK, technology attitudes that are both affective and evaluative. Two technology usage variables: face-to-face and online training using technology.
17	Zhang & Fang, 2022	TPACK	The opinions, beliefs, and attitudes of EFL teachers towards integrating technology.

5.3 Identifying the influencing factors including the internal and external ones

Although studies have shown that English teachers are optimistic about using technology (Huang et al., 2019), their technological integration has remained limited (Bai, 2019), emphasising the need to investigate the variables influencing the degree of technology integration among EFL teachers. The focus on the technical barriers to ICT application by teachers moves gradually from internal psychological variables like beliefs and attitudes to external variables like facility matching, technological support, and organisational rules to design thinking that is directly related to application (Dong et al., 2019; Teo et al., 2018; Tsai & Chai, 2012). To do this, teachers' content-specific knowledge and understanding of their teaching environments (such as regional policies and entrenched attitudes about educational technology) must be acknowledged, examined, and constructively challenged (Ding et al., 2019). It is also advisable that educational authorities and institutions conduct a needs analysis to pinpoint the issues with the integration of digital technologies that their teachers are experiencing. From there, training programmes may be created to suit a variety of needs and preferences (Liang, 2021). Additionally, as suggested by Ding et al. (2019), different practices, such as skill-based, rule-based, and function-based ones, could develop from teachers' various content-specific attitudes. The importance of each type of practice in addressing specific content considerations and boosting students' language acquisition as a whole should be recognised rather than compared to determine which is superior. Therefore, teachers ought to actively seek out cases of how digital technology can be used to support all of these practices, and they should critically assess the benefits and drawbacks of each in light of their specific working settings.

6. Discussion

This systematic review identified the types of research designs on EFL teachers' ICT integration in China, and the underpinning theory as well as the factors that influence EFL teachers at all schooling levels, based on earlier studies. The study's findings have shed important light on how ICT is being used by EFL teachers in China. All selected articles were interpretively analysed and discussed in accordance with the research questions.

Based on the analysis of Table 3, it was found that more quantitative studies (seven articles) than qualitative studies had been done on ICT integration in language instruction from the perspective of the teachers. The survey, correlation, and multiple regression designs were used to examine the factors impacting and influencing the use of ICT. Surveys were the primary tool employed in the design. Some studies used qualitative methods (six articles) like case studies and ethnography designs to thoroughly examine the context and potential motivators for teachers' attitudes on the usage of ICT in EFL teaching. Deeper discussions of the findings were taken through interviews. In this research area, mixed methods (four articles) were also taken into account.

While diverse samples of middle and elementary school teachers were studied in this review, 12 studies out of the 17 selected studies focused on the universities or colleges as the participants, which highlighted the positive aspects of ICT-

integrated teaching at the higher education level as well as the priority that the relevant authorities place on it. Nevertheless, on the whole, research on the use of ICT in EFL teaching at TVET colleges is still limited in China. To prevent biases, and hence raise the standard of studies generally, better study designs and more reliable procedures should be used in future research. The study population must be described precisely, and sample size, power descriptions or variance, and effect estimates need to be backed up.

An overview of existing ideas serves as the theoretical framework for the development of the arguments used in the research. Analysis based on Table 4 found that two important theoretical frameworks were adopted in the 17 reviewed studies, that is, TPACK (n=6) and TAM (n=10). In the TAM, it was shown that a user would have a positive attitude towards the technology if they considered it to be easy to use and useful. Additionally, a user's positive intention to use a technology may be developed by their perception of its utility and a positive attitude; if a person has the intention to use a technology, they will do so (Davis, 1989).

According to the reviewed studies (J. Chen et al., 2022; Huang et al., 2022; B. Li, 2022; G. Li et al., 2019; Zhang & Chen, 2022; Zhang & Fang, 2022), the TPACK framework was frequently employed in the research under review. The majority of EFL teachers had the confidence to integrate the teaching content, pedagogy, and technology into their teaching. However, there is a gap between the TPACK framework's requirements in the curriculum and what is actually taught in EFL classrooms. Some English teachers in the reviewed studies claimed that they were slow to effectively implement ICT-integrated teaching into their practice. Therefore, it is crucial to understand the level of technology knowledge held by EFL teachers, their use of technology, and the influencing factors that affect their technological applications.

7. Conclusion

By utilising the PRISMA guidelines, this study allowed for a comprehensive analysis of existing literature, ensuring that all relevant studies were considered and included. This helped to present a comprehensive view of this issue and reduced the potential for bias.

Before discussing our concluding remarks, it is necessary to point out that the research design we used has certain inherent limitations, such as a common limitation of coverage. There is a need for further empirical study, particularly research that focuses on the ICT competency of EFL teachers at Chinese TVET colleges. Furthermore, owing to the heterogeneity of the studies, the methodologies, the participants' characteristics, the intervention types, and the outcome measures may vary among the included studies, which made comparing and synthesising the data across studies difficult.

This review focuses on the Chinese EFL teachers' integration of ICT in the following aspects: research designs, research samples or target groups, underpinning theories and the influencing factors. As a whole, the findings of this

systematic literature review have significantly increased our awareness of how ICT is integrated by Chinese EFL teachers. This literature review also analysed the challenges experienced by the EFL teachers on ICT integration in Chinese context as well as the influencing factors on ICT usage. It is hoped that it will positively affect knowledge of the notion of ICT in EFL instruction at various educational levels in China. In countries like China, where English is not the native language, ICT offers authentic language learning input and both English students and teachers can take great advantage of technology. This study also gives information to decision-makers and teachers in regard to professional development, including investment in facilities, improved technical assistance, and the delivery of technological training.

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