Digital Literacy in a Global Context: Constructing Models for International Chinese Teachers across Regions and Countries

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Abstract. The research aims to determine the factors that facilitate teaching efficiency for Chinese teachers hired abroad. It is a quantitative study that covers digital skill, cultural and linguistic compatibility, technology policy, integration of technology into the curriculum, training and professional development. However, the current research on these aspects is inadequate in giving a broad understanding of the interaction of the above factors, especially for Chinese educators working in foreign countries. This research seeks to uncover the correlations between these factors and provide recommendations for sound instruction. An e-survey was administered to 350 educational specialists from China, and the data was analyzed through Smart PLS version 3.0 software and structural equation modeling (SEM). Findings indicate that teachers' digital literacy capability predicts technology use in their instruction. The linguistic and cultural dynamism is therefore useful in developing a preparatory setting for technology that is essential in curriculum implementation. In addition, it was ascertained that continuing education also mediates the incorporation of technology and teachers' efficiency. The results stress the need to focus on automation, infrastructure, and professional development for effective integrated tech-based learning. Conferences, seminars, availability of learning resources as well as training and mentorship are essential to ensuring efficacy in teaching and preparing for a variety of contexts in education.

Keywords: teaching effectiveness; digital literacy; cultural adaptability; technological integration; training and support

1. Introduction
Teaching in overseas schools has distinct problems. As new teachers begin their first day of school, they must create lessons based on unfamiliar curricular standards and processes, and adapt to a new culture and language (Johnson,

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2022). In this article, we address these challenges and explain how the use of technology by Chinese teachers in foreign classrooms can assist them to achieve success in their teaching.

The purpose of this research is to increase foreign Chinese teachers' digital competencies regardless of where they teach. This study focuses on teachers in different academic settings: cultural, linguistic, and technological. Various digital literacy practices in schooling, knowledge and information literacy and cyber security awareness in particular are explored.

2. The focus of the current study
This study focuses on the mutually beneficial procedure and the way training programs, collaborative learning communities, and curricular technologies may assist the teachers in attaining a high level of digital literacy. The impact on teaching practice effectiveness, students' participation, including possible limitations like the lack of resources is considered. Last, it provides suggestions on how digital literacy can be promoted among Chinese academics in various countries.

3. The problem statement and research questions
The literature gap addressed in this study concerns how Chinese teachers' digital literacy can be facilitated in diverse settings. The present literature does not provide a sufficiently cohesive framework for the approach to these educators' special needs and concerns, specifically in relation to training and support. There is also a lack of research on the impact of the 21st-century digital literacy programs on teachers' performance and students' outcomes in multicultural contexts. A lack of specific and practical strategies for the development of digital literacy stands out as a concern in multicultural and social environments. It is essential to close these gaps to ensure access to digital literacy programs by overseas Chinese teachers and pave the way to enhancing multicultural students' learning outcomes.

The research questions are:

1. How do digital literacy skills impact teaching effectiveness for international Chinese teachers?
2. How does cultural and linguistic adaptability influence teaching effectiveness?
3. How does technological infrastructure affect teaching effectiveness?
4. How does the integration of technology in the curriculum influence teaching effectiveness?
5. Does the integration of technology in the curriculum mediate the relationship between digital literacy skills, cultural and linguistic adaptability, technological infrastructure, and teaching effectiveness?
6. Does training and support moderate the relationship between the integration of technology in the curriculum and teaching effectiveness?

4. Theoretical Framework
The theoretical framework underpinning this study is the theory of self-directed learning. The theory of self-directed learning (SDL) posits that individuals take

the initiative to diagnose their learning needs, formulate goals, identify resources, select and implement strategies, and evaluate outcomes. This theory emphasizes the learner's autonomy and responsibility in the learning process, developing critical thinking and lifelong learning skills. SDL is often associated with adult education (Knowles, 1975) and professional development (Porter & Freeman, 2020), as it encourages learners to be proactive and self-motivated in acquiring knowledge and skills.

5. Literature Review

The literature review has been organized around the research questions, with each section of the discussion leading to the positing of a hypothesis.

RQ 1: How do digital literacy skills impact teaching effectiveness for international Chinese teachers?

The importance of digital literacy in education, especially for international Chinese teachers working in global contexts, cannot be over-emphasised. While existing research provides valuable insights into digital literacy programs and strategies, there is a research gap on the specific needs and challenges of international Chinese teachers and effective strategies through which they enhance their digital literacy skills. This study seeks to address this gap by developing a customized training and support program to enhance digital literacy among international Chinese teachers and to evaluate its consequences and impacts on teaching effectiveness and student outcomes. This is based on the proposition that the aim of education is subjective, in which the goal is determined by what each person needs, desires, or truly gains from the educational process. Education is viewed from either an individualistic or a social perspective, and frequently the two are discussed independently without taking into account how they are interrelated with the world. Subjectively speaking, the goals of learning and education are the same: bettering one's own life and fostering personal development (Ferm & Thorgersen, 2007).

Many academics believe that technology improvements have led to increased digital literacy. Individuals with digital literacy skills should understand the use of technology as information management tools in the digital age, for management, assessment, and communication (Öncül, 2020). Digital skills can be displayed in presentations, by exchanging knowledge, and by using technology to teach (Kaeophanuek et al., 2018). While the digitalization of public and private services has increased the risk of digital exclusion for the general population, the digital revolution poses a challenge to those who lack the necessary skills to manage its impact on various aspects of life (Iordache et al., 2017).

A large body of research indicates that education is gradually being dominated by the use of digital technology. Overall, there appears to be an increasing influx of digital tools into the educational environment (Livingstone, 2012). Technological infrastructure knowledge is associated with increased productivity, economic stability and civic engagement (Janssen et al., 2019).

Digital literacy and technological infrastructure include all technologies used to manage and disseminate information, including those used in education.

Resources such as desktops, mobile telephony, projection technology, digital recording equipment, software applications, multimedia resources, information systems, intranets, internet, tablets, PCs, e-readers, and laptops provide many opportunities and challenges for education (Lawrence & Tar, 2018). The internet is a particularly valuable resource for teaching as it facilitates access to knowledge for learners. Information systems enhance productivity and save time, making them crucial for administration, decision-making, competitiveness, and development.

Teachers must, therefore, be prepared to use ICT in their teaching and learning practices. Researchers distinguish between various components of teacher teaching effectiveness, including teaching effectiveness for teaching strategies, classroom management, and student engagement (Symesa et al., 2022), leading to the statement of the following hypothesis:
H1: There is an association between digital literacy skills and teaching effectiveness.

RQ2: How does cultural and linguistic adaptability influence teaching effectiveness?

Society aims to maximize the educational value of digital technology used by children. Digital literacy technologies enhance learning by customizing material, improving fundamental skills, culture diversity and creating engaging venues for knowledge exchange (Palomino, 2017).

Globalization and greater cultural variety have made intercultural competency a priority, both locally and globally. Efforts have been made to prepare college graduates for global success. Universities prioritize cultural education through programs like studying abroad, globalization courses, and foreign language instruction (Taguchi et al., 2016).

Adaptation, a component of emotional intelligence, is the capacity to adapt one's feelings and ideas. It has three dimensions: 1) adaptability, 2) flexibility, and 3) resilience which demonstrate confidence and adaptability in the face of changes, obstacles, or constraints. Adaptation is commonly characterized as positive adaptation despite suffering. Students with a high tolerance for ambiguity feel more comfortable in unfamiliar learning environments. Learners' success might be affected by their tolerance for ambiguity (Alahdadi & Ghanizadeh, 2017). Language interpretation and translation technology have helped teachers evaluate student performance. By removing linguistic barriers, teachers may better assess students' knowledge of and abilities in a subject, regardless of their native language. Cross-cultural adaptation involves considering differences between source and destination cultures to ensure meaning consistency (Jeong & Lee, 2021).

Translation of languages may be needed with a due consideration of translation strategies, guidelines or procedures as well as any choices made by not just authorities but also translators, interpreters, and publishers. Translation is described as a factor that govern the choice of text types, or even individual texts, to be imported at a given time by translation into a specific culture/language (Li et al., 2017).

As new technologies enter education, it is important to evaluate the impact of learning technology on teaching and learning. Technology is used in education for several reasons, such as boosting student learning, providing access to education, and motivating learners (Lai & Bower, 2019). Language translation is the greatest alternative for students to grasp the study topic in their home language and communicate successfully with professors who speak different languages. As technology advances, students will be able to interpret and comprehend languages in cultural studies (Blimpo & Pugatch, 2019).

H2: There is an association between cultural and linguistic adaptability and teaching effectiveness.

RQ3: How does technological infrastructure in the curriculum influence teaching effectiveness?

Digital literacy and technological infrastructure integrate knowledge and literacy, linking learning spaces across homes, schools, jobs, and communities to understand the cultural differences in positive way (Livingstone, 2012). Scholars in teacher education seek techniques to anticipate and quantify student teachers' intentions to include digital literacy capabilities. Research has shown that pre-digital literacy abilities are influenced by a variety of factors, including beliefs, efficacy, and behavior (So et al., 2012). Few teachers are willing to integrate digital literacy skills into their teaching methods, despite increasing availability of hardware, school-related support, and increased awareness about the importance of using educational digital literacy skills.

Teachers' successful incorporation of technology appears to be influenced by factors other than technical knowledge and aptitude. Teachers' knowledge, beliefs, and attitudes impact what they wish to accomplish in their classrooms and provide basic explanations of teaching approaches apply in different cultures (Sang et al., 2010). Teachers' use of technology in student assessments to inform academic career decisions has prompted questions about their dependability, correctness, and potential bias (Catano & Harvey, 2011)

According to the literature, there are two main methods for efficiently retrieving and permanently retaining information in mobile learning. One is multimodal presentation, which uses various media types to convey knowledge. The cognitive theory of multimodal learning claims that both visual and auditory channels are how knowledge develops. By stimulating both channels and creating linkages between knowledge forms and their storage in memory, learners who engage with information in multimedia formats are better able to retain information and speed up knowledge retrieval (Kohnke et al., 2019). The mobile application being used and its features may have an impact on the students' acceptance of using them for learning purposes. According to research on learners' readiness for mobile learning, there are some preferred mobile learning elements that students favor, including audio learning modules, study suggestions, and reminders of important occasions. However, even though students enjoy using their phones in class, there is still a limit to their use because lecturers discourage it.

Large file storage is another challenge for learners, as certain learning apps continuously drain the battery of their phones (Deris & Shukor, 2019).

Smartphones and apps are a vital part of our lives in the era of Industrial Revolution 4.0, marked by growing automation of traditional production processes and the deployment of state-of-the-art smart technologies. Statistics reveal that 90% of mobile time is spent on apps (Klimova, 2021). A study by Chatterjee et al. (2023) explored how the organization of digital workplaces impacts performance and the role of digital leadership in enhancing the work environment. The study by AlAjmi (2022) aimed to examine how school administrators' digital leadership affects the incorporation of technology in teaching while a review by Mumtaz (2000) emphasized the importance of teachers' perspectives in integrating technology into teaching and learning. A case study of a private school system in Lahore investigated how school leaders influence the use of digital infrastructure for teaching and learning (Qureshi, 2013). School leaders play a crucial role in establishing technical infrastructure in schools. Teachers must be knowledgeable about new technologies, proficient in their use, and capable of fostering a school culture that encourages the exploration of innovative methods in teaching, learning, and administration (Haleem et al., 2022). The following hypothesis can thus be stated:

H3: There is an association between technological infrastructure and teaching effectiveness.

RQ4: How does the integration of technology in the curriculum influence teaching effectiveness?

Over the past decade, there has been a significant increase in students' emphasis on digital information and communication skills, which are now viewed as essential 21st century competences. These abilities include a wide range of contexts and new technologies, and they correspond to numerous aspects of integration of technology in curriculum knowledge, beliefs, attitudes, and values. Information is now simple to find and accessible to everyone thanks to new technology. However, since anyone can publish on the internet regardless of the caliber of the information transmitted, it is crucial for students to learn how to work with digital information (Siddiq et al., 2016). While more technological hardware is available, schools are promoting its integration into the curriculum, and teachers are becoming more aware of the benefits of using integration of technology in curriculum in education. However, there is still some reluctance by teachers to incorporate integration of technology in curriculum into their teaching methods. To properly incorporate technology, educators need more than just technical qualifications and expertise. For example, a focus is needed on teachers' knowledge, attitudes, and beliefs as they "influence what they want to do in their classrooms and provide a fundamental explanation of the teaching methods that remain over time" (Sang et al., 2010). This discussion lead to the positing of the following hypothesis:

H4: There is an association between integration of technology in curriculum and teaching effectiveness.

RQ5: Does the integration of technology in the curriculum mediate the relationship between digital literacy skills, cultural and linguistic adaptability, technological infrastructure, and teaching effectiveness?

The effectiveness of teaching is undeniably the main precursor to student success. It is therefore essential that teachers have the ability to motivate,

support, and initiate learning in the classroom, and facilitate the achievement of the teaching goals. Teachers believe that hard work instills pride in the school, and they take pride in being part of the institution by expressing their loyalty to the community and the school through effective teaching. A dedicated teacher will offer support to students in need both inside and outside the classroom, providing unwavering assistance to underachievers and promptly addressing their requests (Huang, 2011). A passionate and trained teacher inherently values students' rights and is a committed, enthusiastic professional eager to share real-life connections to the subjects they teach (Kaymakcı et al., 2022). Research highlights the significance of this dedication, demonstrating that a committed teacher's performance, innovative spirit, and initiative in the classroom directly arise from their commitment (Bajunid, 1996). Such an approach to teaching is conducive to high retention rates of students in schools. Dedicated teachers will keep themselves up to date with changing trends in pedagogy, one of which is the increasing requirement to use technology in teaching. Teachers must, therefore, also demonstrate technological ability, which will help them when using technology in the classroom (Munna & Kalam, 2021).

Teaching effectiveness is described as "one's belief in one's ability to organize and implement the action necessary to accomplish it". Different activity domains have different levels, and a teacher's efficacy is determined by their beliefs. Belief in a student's ability to achieve desired objectives, such as learning and engagement or completing a specific instructional activity can significantly enhance their motivation and performance (Woodcock et al., 2022).

Quality teachers are also known for their innovative teaching and learning methods. Advancements in technology have created a "flood" of information and resources, transforming how individuals learn, function in business, maintain connections, and access information effectively (Szymkowiak et al., 2021).

It is expected that schools and universities should contribute to the processes of information technology-enabled networking which is a key tool in education and school growth. Online networking provides multiple opportunities for teachers to expand their academic knowledge (Kankaanranta, 2001).

Research on teacher education suggests that student teachers benefit from extended periods of "new experiences" in a new environment where they can readily engage with technology. This allows them to demonstrate their expertise and actively use technological tools (So et al., 2012). One of the few characteristics consistently associated with student performance is teachers' perceived value, or "confidence in their ability to positively influence student education" (Woolfolk et al., 1990). However, it has been found that few teachers use ICT in their instructional activities, despite its greater availability and assistance (Sang et al., 2010).

Maintaining quality claims alone is insufficient. Teacher applicants should have the chance to explore technology-inspired teaching practices. For example, science experiments go deeper, are more quantitative, require more sophisticated reasoning skills, and use more sophisticated tools and technology.

According to a practitioner-based study, the teachers carefully analyzed each set of artifacts as soon as they were available, completing a data review to define the beginning point of the analysis (Taylor et al., 2004). Science standards recommend professional development courses that help teachers use a variety of technical tools, such as computerized databases and laboratory specialized equipment as well as college training experiments that include opportunities for "data interpretation using appropriate technology" (Keeler, 2014).

Observing students can help teachers better understand their requirements and the many learning abilities they possess. Teachers may ensure different learning practices are addressed by adding more technology into the curriculum. Students will become more engaged and accountable for their learning achievements. Valdez et al. (2020) state that the inevitable outcome is that the successful implementation of technology is of utmost importance to our future. By using technology, learning content in any course can be modified, added to and updated from multiple sources, enabling students to learn and exchange knowledge. Having access to and processing information in unique ways and enhancing communication, learning and intelligence can enhance technological skills for all populations (Jackson et al., 2009).

Because technology plays such a large role in education, any prediction of the future of education must examine technological advances and the fact that technological advances are driving the future. Implementing the use of technology in curriculum is critical for transformation of education at all levels. Current developments in technology and social software significantly change: a) how students access information and knowledge, and b) how students interact with the teacher (Abdullah, 2016). The first step is to integrate it into the curriculum. Technology-enhanced education entails more than just learning how to use hardware and software. To effectively employ technology in education, it is important to understand the particular educational principles involved. Curriculum-based training helps teachers comprehend the significance of technology in designing and implementing class activities (Bailey et al., 1996). This discussion leads to the statement of the following hypothesis:

H5: Integration of technology in curriculum mediates the relationship among digital literacy skills, cultural and linguistic adaptability and technological infrastructure on teaching effectiveness.

RQ6: Does training and support moderate the relationship between the integration of technology in the curriculum and teaching effectiveness?
In order for students to receive instruction and guidance on a subject, teachers must acquire the appropriate abilities and have a positive attitude toward teaching it. It is crucial for teachers to have the necessary knowledge, skills, and attitudes. (Janssen et al., 2019).

Effective education directly affects student success and learning experiences. Teachers face increasing expectations and changes in their duties. Teacher education programs must provide all teachers with the required information, skills, and support throughout their careers (Aleandri & Refrigeri, 2014). The continuing and deep changes characterizing learning environments and the learners in our schools come with changing demands on the teaching profession.

Some of these demands are legitimate and perfectly explainable, as they are simply a natural evolution and transformation of education systems. Nevertheless, other demands are rather new and innovative in nature, bringing into debate the professional identity of teachers as a whole (Ciolan, 2013).

Teachers' effectiveness can be influenced by the basic integration of technology in the curriculum, which extends beyond job requirements to commitments like improving students' lives or advancing the fields they teach (Barton & Dexter, 2020). Teachers' readiness to concentrate their efforts on providing excellent instruction, displaying greater enthusiasm for their subjects, and allocating more time to students are all signs that they are committed to teaching (Ibrahim & Aljneibi, 2022). They will consider new evidence as it emerges which will enhance their innovative thinking demonstrated by an active willingness to listen to more than one side, to focus on the resulting facts, to focus entirely on new possibilities and even discover possible errors in their most cherished beliefs. When the phrase innovative thinking is employed in the context of education, researchers define educational innovation as the use of or the introduction of new educational instruments, instructional methods, and organizational systems to improve educational quality and production (Orakcı et al., 2020). Motivation may be crucial in situations where teachers choose not to share their information, experiences, and ideas, although empirical research has found favorable links between motivation and knowledge sharing (Wang et al., 2021). Teacher effectiveness is linked to teacher efficacy which in turn is linked to the level of training they receive (Sang et al., 2010). This would include training on technology integration. This discussion leads to the statement of the following hypothesis:

H6: Training and support moderates the relationship among integration of technology in curriculum and teaching effectiveness

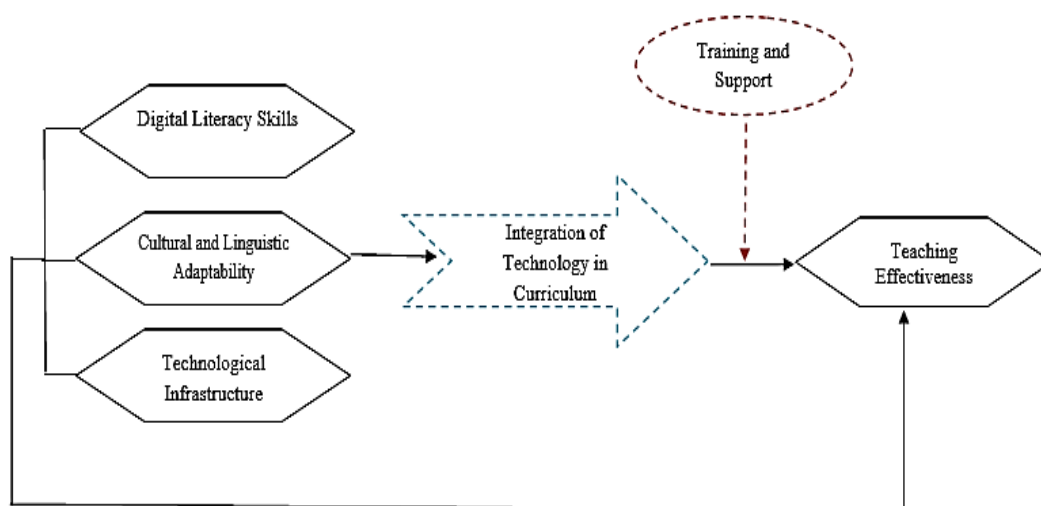The hypotheses are depicted in Figure 1 and form the conceptual framework of the study.

Figure 1: Conceptual Framework

5. Methodology

5.1 Research Design

The research method adopted in this study is the quantitative research method to assess the Chinese International teacher's digital literacy and teaching efficacy. Quantitative methods make it possible to engage in research with a high level of structure since the analysis is done using statistical, mathematical, or computational tools.

5.2 Population and Sample Size

The target population for this research includes Chinese teachers teaching in different settings in the global community. The target population consists of 350 international Chinese teachers. This size was determined by a Power analysis that suggests a minimum sample size of about 10-20 times the number of variables in the study. Random sampling was used to collect data from various geographical areas and types of institutions.

5.3 Data Analysis

The study used Smart PLS 3.0, an efficient SEM software program. It was particularly useful in understanding complex interactions between multiple factors. The analysis was conducted in two stages: first, we tested the accuracy and robustness of the measurement model. We used a structural model to test our hypothesis on the relationship between variables. Smart PLS 3.0 software has powerful analytical tools that facilitate analysis and execution. It involves using Cronbach's alpha to verify factor loadings, absolute reliability, and the adequacy of the measurement model, followed by structural model testing to examine the dimensions, significance, and structure of the methods as appropriate.

Table 1: Measurements used in the study

Variables	Items	References
Digital literacy skills	Five items	(Kaeophanuek et al., 2018)
Cultural and linguistic adaptability	Five items	(Su et al., 2015)
Technological infrastructure	Five items	(Ergüzen et al., 2021)
Integration of technology in curriculum	Five items	(Abdullah, 2016)
Relationship between digital literacy skills, cultural and linguistic adaptability, technological infrastructure, and teaching effectiveness	Five items	(Munna & Kalam, 2021)
Training and support	Five items	(Brock & Carter, 2016)

6. Results

Current data on the specific deficiencies and difficulties of teachers and students related to digital literacy, effective training and support programs, and outcomes of such programs on teachers and students' instructional classroom practices, as well as evidence-based strategies to facilitate digital learning. When reporting t-tests, hypothesis test results use, beta coefficients, t-values, and p-values. Tables and figures are used to present complex data clearly, but before that, it should be properly labeled and cross-referenced before summarizing the key findings of the study and the implication of the study findings.

Table 2 displays the dependability statistics of the key variables in this investigation. The measuring scale's internal consistency and reliability was assessed using Cronbach's alpha, composite reliability, and average variable extracted (AVE) values for each variable. The results of a special test called Confirmatory Factor Analysis (CFA) for these ideas, proving they were reliable and work well together. The table shows cultural and linguistic adaptability score of Cronbach's alpha is 0.753, (covariance ratio [CR] = 0.833), and AVE of 0.501. Digital literacy skills Cronbach's alpha is 0.755, (CR = 0.835), and AVE of 0.508. Integration of technology in curriculum Cronbach's alpha is 0.742, (CR = 0.830), and AVE of 0.514. Teaching effectiveness Cronbach's alpha is 0.761, (CR = 0.841), and AVE of 0.532. Technological infrastructure Cronbach's alpha is 0.805, (CR = 0.865), and AVE of 0.566. Training and support Cronbach's alpha is 0.774, (CR = 0.842), and AVE of 0.517. These AVE values were higher than the suggested limit of 0.50, showing that the scales used to measure are reliable and match well. The strong CR values, paired with high AVE scores, help make sure the internal consistency and reliability of these constructs are good.

Table 2: Reliability Statistics

Variables	Cronbach's alpha	CR	AVE
Digital Literacy Skills	0.755	0.835	0.508
Cultural and Linguistic Adaptability	0.753	0.833	0.501
Technological Infrastructure	0.805	0.865	0.566
Integration of Technology in Curriculum	0.742	0.830	0.514
Relationship between digital literacy skills, cultural and linguistic adaptability, technological infrastructure, and teaching effectiveness	0.761	0.841	0.532
Training and Support	0.774	0.842	0.517

Table 3 and Figure 2 present the results of the CFA for the measured items, illustrating the factor loadings that indicate the relationship between each item and their respective constructs. The cultural and linguistic adaptability measure comprises five items, with factor loadings ranging from 0.645 to 0.751, demonstrating a strong association between the items and the underlying construct. The digital literacy skills measure includes five items, with factor loadings from 0.508 to 0.804. The integration of technology in the curriculum is represented by five items, with factor loadings ranging from 0.322 to 0.823. The teaching effectiveness measure includes five items, with factor loadings from 0.341 to 0.823. The technological infrastructure measure is represented by five items, with factor loadings ranging from 0.671 to 0.819. The training and support measure includes five items, with factor loadings from 0.513 to 0.805. These values indicate that the model is reliable, meaning the observed items accurately measure their intended constructs. The results of the CFA confirm that the instruments used in this study are trustworthy and accurate, providing a solid foundation for future research.

Table 3: Factor loadings

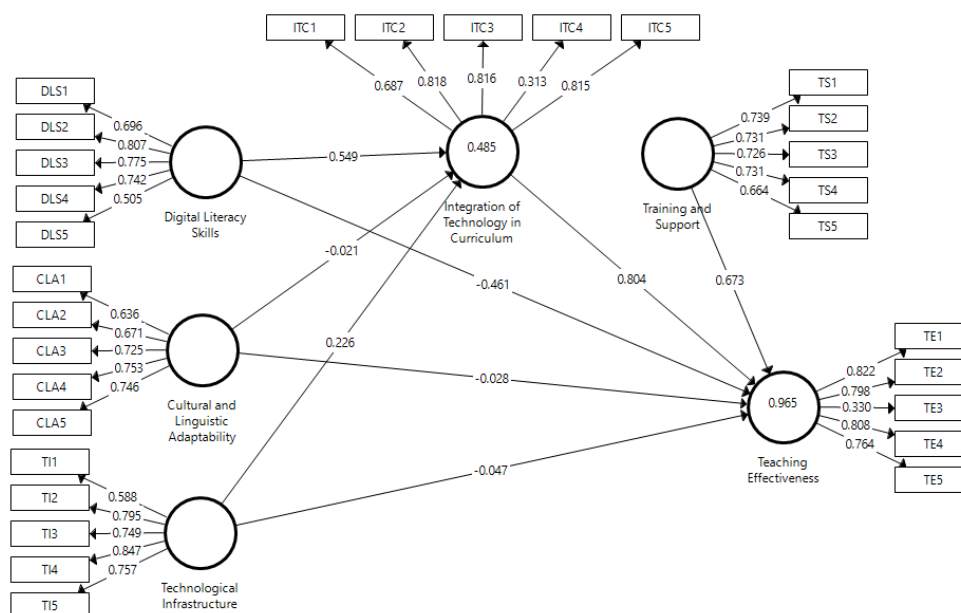| Variables	Items	Indicators
Digital Literacy Skills	DLS1	0.696
	DLS2	0.804
	DLS3	0.774
	DLS4	0.739
	DLS5	0.508
Cultural and Linguistic Adaptability	CLA1	0.645
	CLA2	0.663
	CLA3	0.724
	CLA4	0.751
	CLA5	0.744
Technological Infrastructure	TI1	0.801
	TI2	0.703
	TI3	0.819
	TI4	0.732
	TI5	0.671
Integration of Technology in Curriculum	ITC1	0.823
	ITC2	0.799
	ITC3	0.322
	ITC4	0.811
	ITC5	0.763
Relationship between digital literacy skills, cultural and linguistic adaptability, technological infrastructure, and teaching effectiveness	TE1	0.823
	TE2	0.796
	TE3	0.341
	TE4	0.807
	TE5	0.764
Training and Support	TS1	0.695
	TS2	0.805
	TS3	0.775
	TS4	0.740
	TS5	0.513

Figure 2: Measurement Model

Table 4 compares the fitness of the estimated model to the saturated model to assess if the structural equation model was suitable. Foot metrics like SRMR and likelihood ratio assess the adequacy of the chi-square test model. The estimated model had a little greater residual error than the saturated model (SRMR values of 0.119 and 0.119, respectively). Additionally, the likelihood ratio chi-square tests demonstrate substantial disparities between the estimated and saturated models (p-values <0.05), showing a lack of fit for the calculated model. The chi-square scores for baseline and saturated models indicate substantial differences between the two models. Overall, the estimated model gave acceptable similarities with the data. However, the gap between the estimated and saturated models highlights possible areas for improvement in the structural equations model.

Table 4: Model Fitness

	Saturated Model	Estimated Model
SRMR	0.119	0.119
d_ULS	6.621	6.628
d_G	n/a	n/a
Chi-Square	infinite	infinite
NFI	n/a	n/a

Table 5 displays the R-squared values for the latent construct of each structural equation model, illustrating the number of changes in the external effects for each endogenous variable. The model's external components accounted for 96.5% of the diversity in teaching techniques (R-squared = 0.965). Exogenous variables determine the qualifications of 48.5% of research participants, with an R-squared value of 0.485. R-squared values indicated how external components in a structural equation model predict and impact endogenous variables. The

model's exogenous factors significantly predict instructional approach and teacher skill.

Table 5: R-Square

	R-Square	R-Square Adjusted
Instructional Approach	0.485	0.481
Teacher Expertise	0.965	0.965

Table 6 and Figure 3 show the findings of the straight line study, mainly about how cultural and linguistic adaptability, digital literacy skills, and technological infrastructure affected teaching effectiveness with respectively p-value of 0.045, 0.000 and 0.000. The findings of the straight line study, mainly about how cultural and linguistic adaptability, digital literacy skills, and technological infrastructure affected integration of technology in curriculum with respectively p-value of 0.081, 0.000 and 0.000. The connected p-value is 0.000, which is less than the usual importance level of 0.5. This confirms that this has a big effect in numbers. Integration of technology in curriculum affected teaching effectiveness with p-value of 0.000. The findings of the straight line study, mainly about how integration of technology in curriculum positively mediated the cultural and linguistic adaptability, digital literacy skills, technological infrastructure with respectively p-value of 0.003, 0.000 and 0.000. Figure 4 show the findings of this study, mainly about how training and support positively moderated the integration of technology in curriculum and teaching effectiveness with p-value of 0.032.

Table 7: Path Analysis

Hypothesis	Beta	STDEV	T Value	P-Values	Results
Cultural and Linguistic Adaptability -> Integration of Technology in Curriculum	-0.021	0.050	0.412	0.081	Not Accepted
Cultural and Linguistic Adaptability -> Teaching Effectiveness	-0.028	0.014	2.009	0.045	Accepted
Digital Literacy Skills -> Integration of Technology in Curriculum	0.549	0.053	10.368	0.000	Accepted
Digital Literacy Skills -> Teaching Effectiveness	-0.461	0.053	8.760	0.000	Accepted
Technological Infrastructure -> Integration of Technology in Curriculum	0.226	0.057	3.983	0.000	Accepted
Technological Infrastructure -> Teaching Effectiveness	-0.047	0.016	3.028	0.003	Accepted
Integration of	0.804	0.023	34.582	0.000	Accepted

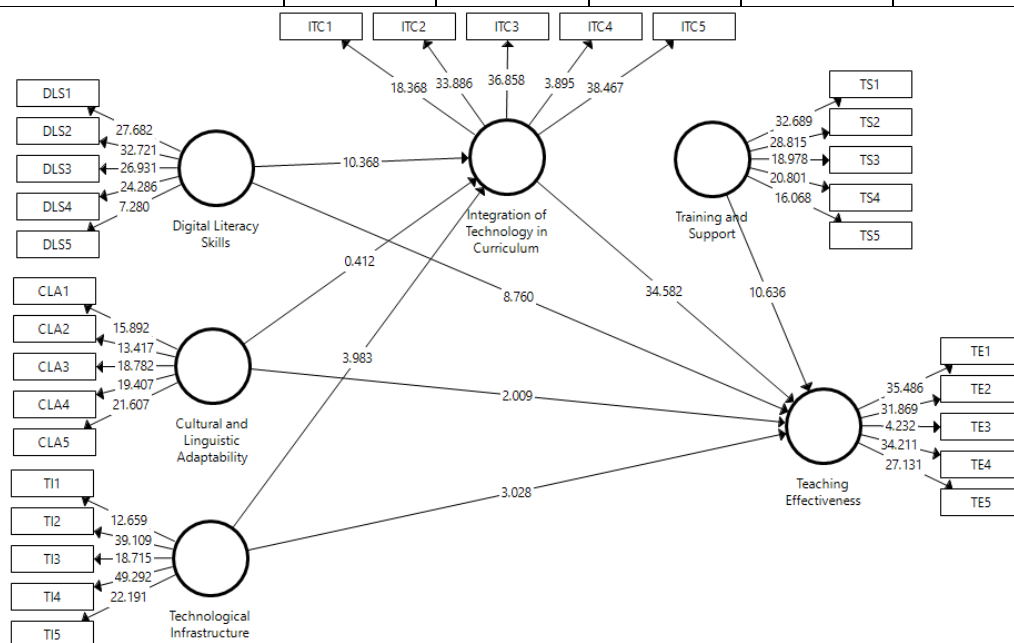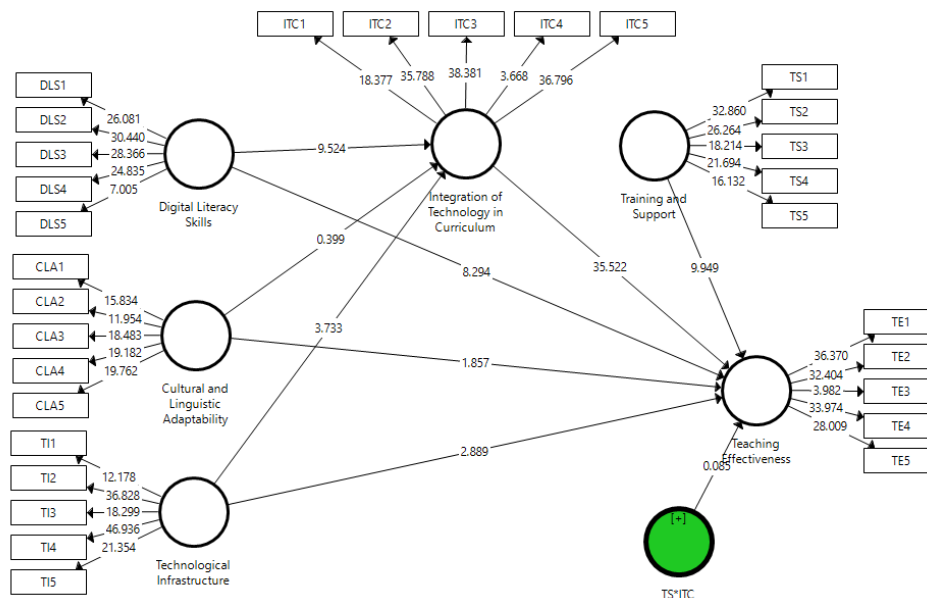| Hypothesis	Beta	STDEV	T Value	P-Values	Results
Technology in Curriculum -> Teaching Effectiveness					
Cultural and Linguistic Adaptability -> Integration of Technology in Curriculum -> Teaching Effectiveness	-0.017	0.040	0.412	0.003	Accepted
Digital Literacy Skills -> Integration of Technology in Curriculum -> Teaching Effectiveness	0.441	0.046	9.637	0.000	Accepted
Technological Infrastructure -> Integration of Technology in Curriculum -> Teaching Effectiveness	0.182	0.044	4.102	0.000	Accepted
TS*ITC -> Teaching Effectiveness	0.001	0.007	0.085	0.032	Accepted

Figure 3: Structural Model

Figure 4: Moderation Analysis

7. Discussion

The empirical results as follows shed light on improving the teaching effectiveness of the international Chinese teachers. According to the results obtained, it can be postulated that the (Hypothesis 2) Cultural and linguistic adaptability has a negative effect on the integration of technology in curriculum is not accepted since the estimate value is (β = - 0. 021, p = 0. 081). Nonetheless, it has a positive impact on the teaching performance (β = -0. 028, p = 0. 045), which indicates that flexibility with these emerging aspects entails improved results in teaching. Teacher digital literacy skills as the variable comes out to be statistically significant in a linear regression model with both the predictor and criterion variables; integrating technology in the curriculum (r = 0. 549, p < 0. 05) and effectiveness of teaching (r = - 0. 461, p < 0. 05). This re-emphasizes the need for information technology competencies in today's society. Based on this equation, more digitally proficient teachers are more likely to fully integrate technology into their teaching and learning processes making their teaching more effective. Technological structure is also one of the important factors that will drive the change. The analysis depicted positive effects on the technology in the curriculum (ß = 0. 226, p = 0. 000) and teaching efficiency (ß = -0. 047, p = 0. 003). Sufficient technologies are mandatory for performing and utilizing digital education initiatives and approaches. The findings revealed that the application of technology into the curriculum increases the effectiveness in teaching (Mean = 4. 3013, t= 5. 174, p = 0. 000). This emphasizes the need to have proper integration of technology in use in the learning institutions. Furthermore, the mediated relationships indicate that cultural and language sensitivity has an impact on teaching effectiveness by way of introducing technology into the learning process or curriculum, more so the digital literacy skills of the teacher, and the technological support that is available. Precisely, the Kind of resource DL (Digital literacy skills) (β = 0. 441, p = 0. 000) and Technological infrastructure (β = 0. 182, p = 0. 000) influence teaching effectiveness through

this pathway. Finally, the technological support and the technology integration in curricula have a positive influence on the measure of teaching effectiveness with a beta value of 0. 001 and a p-value of 0. 032. This underlines the necessity of teachers' constant professional development and help in using technologies for learning.

8. Conclusion

Based on the empirical evidence, it is possible to identify several crucial factors that can promote the improved effectiveness of teaching among the international Chinese teachers in the context of the modern educational environment. First of all, although the cultural and linguistic flexibility did not influence procurement of technologies in formative learning, it indirectly determined teaching efficiency. This therefore emphasizes one of the most crucial aspects in education, namely, the competency of educators to share cultural and language characteristics with diverse students so as to improve learning among such students. Secondly, the levels of digital literacy were also revealed as the foundation for technology-enhanced curriculum incorporation and the enhancement of teaching quality. Teachers who have adequate knowledge of technology have the ability to use the tools in the class in order to increase the interaction and learning in the class. Thirdly, the extent of technological development enhances the incorporation of technology in the curriculum and enhances the teaching of the course. Availability of proper technological assets enables the smooth integration of digital education plans which in the end leads to better outcomes in education. Furthermore, the correlation between the use of technology in the curriculum and the teachers' teaching efficiency was further affirmed by the data. Through proper integration of the technological advances in the classroom, teaching becomes more interesting and results in improved teaching competence. Lastly, the factors suggest that there is a need to engage in continuous training and support mechanisms that help to enhance these factors. Professional development can be recurrent in nature so that the teachers always keep abreast with the most advanced forms of technology and modern methods of teaching to maintain and even improve on student performance in school. Thus, it can be concluded that by concentrating the efforts toward improving the digital literacy skills among the international Chinese teachers, promoting effective technological support, cultivating the necessary cultural and linguistic flexibility as well as providing sufficient practice and training, the problem of helping the international Chinese teachers to respond to the needs of the modern digital teaching-learning environment could be effectively solved in the framework of the vision of providing digital education for all.

8.1 Practical Implications

The benefits such as skills in digital literacy, language and cultural adaptation, development of technology infrastructure, integration of the curriculum, training and consulting as well as teaching can all be found in the real world. Teachers use multiple languages and have different cultures; therefore, there should be periodical staff training that is aimed at individual needs. Education centers should allocate funds for buying digital technologies, internet connectivity that is reliable and software that is instructional for the overall effectiveness of the teaching-learning process. In addition, such institutions must

also give the required technical support to resolve any issues generated by the integration of technology. Teachers should have the tools and skills to recognize the linguistic and cultural diversity among their students and to interact with them on a meaningful level. Multilingualism can be cultivated in this way, and the school curriculum can be made more multicultural, allowing children to learn a second language. In conclusion, by targeted attention, academies and universities should be offering teachers the necessary training and professional support. This would enhance teaching effectiveness and would also help teachers adapt to changing demographic aspects and digitalization. Creating learning environments that include digital technology is an integral part of learning design and requires the effective application of such technology in teaching.

8.2 Theoretical Implications

Theoretically, managing the cultural and linguistic diversity within the classroom may prove very difficult for teachers, as they are supposed to be an authority figure in curriculum. Policy frameworks emphasizing the components of educators'-training and supporting their digital literacies and cultural sensitivity can further support effective learning and development. The adaptation of cultural and linguistic aspects pose practical challenges as far as instructional delivery are concerned, and educators can be required to provide logical solutions to this. The hypothesis referring to a culturally responsive and linguistic-diversifying frameworks may suggest practice of teaching taking into account issue of equal access of languages and education. In this context, the theories of self-directed learning and professional development underline the role of proficient continuous learning and development for educators. The abstract models demonstrating how teachers' digital literacy skills and cultural competence are important can serve as the foundation where policies and strategies are established to support lifelong learning and help educators with professional development. Hence, the study clarifies the need for multidirectional strategies that are based on a union between teaching effectiveness, a development of digital literacy skills, cultural and linguistic open mindedness, technological infrastructure availability, integration of technology in the curriculum, and training and support provision. By incorporating these elements into educational pedagogy, researchers can help develop a theory that encompasses various approaches to global learning objectives and educational standards.

9. Limitations

There are differences in teaching methods, learning materials, and cultures. In addition, teachers deployed in disadvantaged or rural areas may have difficulty accessing and using both training and support services. Without many opportunities for professional development, teachers may not have the credentials and experience necessary to integrate technology into their teaching or to meet the linguistic and cultural needs of their students. Teachers find it difficult to make such arrangements and acquire the resources needed to create and integrate teaching and learning tools that employs technology to facilitate teaching and increase learner achievements. Generally, the primary goals of education are substantial improvements in curriculum integration, training,

support, cultural language exchange, digital literacy skills, technology infrastructure, and effective instruction but with some limitations, the existence of which needs to be recognized and addressed.

10. Recommendations for practice

Addressing the limitations identified in educational practices, several suggestions can be proposed to support teachers and enhance learning outcomes. Key recommendations include continued investment in technology infrastructure to ensure equitable access to digital resources, especially in disadvantaged or rural areas. Professional development initiatives tailored to diverse needs should be prioritized, focusing on enhancing digital literacy and pedagogical skills through workshops and mentorship programs. Curriculum integration efforts should emphasize the meaningful incorporation of technology and culturally diverse materials to support inclusive learning environments. Policies should be developed to align educational standards with technological advancements and promote equitable resource distribution. Implementation of robust evaluation mechanisms will be crucial for monitoring the effectiveness of these strategies and gathering feedback for continuous improvement. By prioritizing these suggestions, educational stakeholders can work toward overcoming existing challenges and fostering environments where all teachers are equipped to deliver effective instruction and support student success.

11. Recommendations for further research

- Further research could explore the effectiveness of various professional development programs in enhancing teachers' digital literacy and their ability to integrate technology into their teaching practices. This could involve comparative studies of different training models, including workshops, online courses, and mentorship programs, to determine the most effective methods for equipping teachers with the necessary skills and knowledge.
- Research could focus on identifying the specific barriers faced by teachers in disadvantaged or rural areas in accessing and using training and support services. Studies could investigate the availability and effectiveness of technology infrastructure in these regions and propose targeted strategies to improve access and support for these teachers, ensuring they can effectively integrate technology into their classrooms.
- Further studies could examine the impact of incorporating culturally and linguistically diverse materials into the curriculum on student engagement and learning outcomes. Research could assess how these materials influence the inclusivity and effectiveness of teaching practices and identify best practices for integrating such materials to support diverse student populations. This research could also explore how teachers can be supported in developing and using these resources effectively.

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