

Integration of information and communication technology in teaching English among in-service teachers

Peng Ran, Rafiza Abdul Razak, Siti Hajar Halili

Department of Curriculum and Instructional Technology, Faculty of Education, Universiti Malaya, Kuala Lumpur, Malaysia

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ABSTRACT

The widespread application of information and communications technology (ICT) in the field of education has drawn criticism. This investigation was to discover factors influencing English language teaching (ELT) in-service teachers' integration of ICT. The sample consists of 1216 in-service teachers who teach English language in China. Four factors are found to influence ELT in-service teachers' integration of ICT: attitudes, self-efficacy, digital competence, and digital tools use. The findings of the research utilizing the partial least squares structural equation modeling (PLS-SEM) approach demonstrated that all four criteria have a substantial impact on how ICT is integrated by ELT in-service teachers. By considering all the variables that affect ELT in-service instructors, this research offered helpful insights for an effective designs of English language teaching with ICT.

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Corresponding Author:

Rafiza Abdul Razak

Department of Curriculum and Instructional Technology, Faculty of Education, Universiti Malaya

50603 Kuala Lumpur, Wilayah Persekutuan Kuala Lumpur, Malaysia

Email: rafiza@um.edu.my

1. INTRODUCTION

During the era of artificial intelligence, technological advances have profoundly affected human productivity, living, and thinking, and the knowledge society has also demanded changes in education. There has been a global trend toward digital transformation in education. Information and communications technology (ICT) is being investigated as a means of enhancing classroom instruction, which includes lessons in English. Accordingly, it contends technology has become a fundamental part of our lives, revolutionizing it in the process, and language education cannot ignore this fact. Due to the large reliance on ICT in our world, digital literacy is critical for effectively utilizing it [1]. Teachers of English language teaching must consider ICT tools as part of the act of teaching and learning in terms of school subjects in general. The teaching-learning process is well known to be driven by teachers [2]. Foreign language courses provide language learning inputs for students primarily through their English language teachers. Teachers need the necessary skills concerning ICT and its integration into language teaching to fully take advantage of ICT. The smooth combination of ICT-related innovations in education is dependent on a teacher's ability to incorporate technology into creative pedagogy, as well as on developing an active learning environment that combines technology and creative pedagogy [3].

However, the implementation of information technology in education also has some challenges. Although ICT is widely acknowledged as a valuable tool to use in teaching, research has found that teachers choose not to implement ICT because lack technical literacy, they lack the support of universities and institutions, and they lack adequate training [4]. The effects of these problems could also be felt by other stakeholders (e.g., university administrators, curriculum designers, and IT staff) [5]. The integration of ICT into teaching practices and student learning are directly influenced by the attitudes of instructors toward ICT

[6]. This study will benefit educators and stakeholders because it provides a comprehensive comprehension of how technology is utilized in language instruction. ICT and multimedia integration in teaching methods can be strongly influenced or hindered by teachers' views on technology. Such a view can greatly affect the design and development of curriculum content [7].

Among those studying languages inside and outside the classroom, technology is increasingly regarded as an important aspect of the learning process [8]. According to 40 years of research, using appropriate technology may increase student engagement and enhance academic accomplishment. Both technology enthusiasts and skeptics believe that the advancement of technology will bring about a knowledge revolution [9]. One of our greatest challenges and one we must address is how to capitalize on technology and use it effectively in learning and teaching [8].

Teachers serve as transformational leaders by facilitating the transition from traditional to modern classrooms. However, when it comes to language instruction, the vast majority of instructors only use technology to provide learners with simple, low-level activities [10]. Given the pivotal role of language teachers in the shift toward greater use of technology in education, it is important to investigate and understand the factors that discourage educators from implementing technological solutions in the classroom [11]. In summary, there is a need for a better understanding of factors influencing English language teaching (ELT) in-service teachers' ICT integration to enhance teachers' ability of ICT integration and better promote the process of language teaching and learning.

A review of previous studies that are pertinent to the findings in this study can be found in this section. ICT is a crucial component of English language teaching, and teachers are the ones that lead ICT in classrooms, so it is important to identify the issues that may hinder this integration as soon as possible. The emphasis of this research review is on attitudes, self-efficacy, digital competence, and digital tools use.

According to previous researchers [12]–[14], ICT provides us with a variety of ways to learn while enabling teachers to teach in a variety of ways as well. Technological advancements allow teachers to make sense of technology. The teacher must have a positive attitude when using it efficiently and creatively. Consequently, to assist and inspire teachers and change their attitudes toward ICT, it is necessary to provide them with the necessary infrastructure, in-service training, and refresher courses. The previous research findings [15], [16] also demonstrated that teachers' attitudes about the application of ICT in English education and training were favorable. However, several of them continued to experience issues such as a lack of ICT equipment, incompetence, and weak institution regulation. As a result, it is necessary to improve the infrastructure and facilities in each school as well as the ICT skills and knowledge of the teachers. The authors make the following hypothesis in light of their evaluation of the prior literature: attitudes will be positively related to ELT in-service teachers' ICT integration (H1).

Teachers' self-efficacy should represent their confidence in incorporating ICT into their teaching practice, according to self-efficacy researchers who subscribe to Bandura's theory of self-efficacy in education. Self-efficacy, as defined by psychologist Albert Bandura, is an individual's subjective evaluation of his or her own abilities [17]. Previous researches [18]–[20] found a beneficial relationship between instructor self-efficacy and ICT integration. Scientists have shown that educators' confidence in their own abilities to acquire new knowledge influences how eager they are to continue doing so throughout their careers. In addition, the self-efficacy, lifelong learning inclinations, and professional competence of English instructors differed significantly by gender. Teachers' professional competencies vary depending on their age and the type of institution they teach in. It is also essential to note that English teachers' confidence in integrating technology varies according to the type of institution in which they work [21]. For this reason, it is hypothesized that self-efficacy will be related to ELT in-service teachers' ICT integration (H2).

Digital competence is also an important aspect in the usage of ICT in education. Several well-established frameworks for measuring global ICT competency have been presented in recent years. These frameworks employ numerous words, including ICT literacy, digital literacy, and ICT competency [22]. According to Tondeur *et al.* [23], ICT competency is the most frequently acknowledged term for describing how to use digital technology. The practical application of digital expertise, abilities, and feelings is referred to as digital competency. According to prior research [24]–[26], the degree of digital competence is a significant factor in the successful implementation of teachers' ICT integration. As a result, it is hypothesized that: digital competence will be favorably associated to ELT in-service teachers' ICT integration (H3).

Teaching-learning processes have been greatly impacted by the fast growth of ICT tools and the internet. By incorporating ICT into the instruction-learning procedure, learners are more effective in comprehending courses and topics [27]. Pedagogical methods and information become easier to use and increase the quality of learning. ICT has a huge impact on everyone these days, especially teachers, because it provides additional options for enhancing teaching-learning approaches [28]. As a didactic tool, ICT tools can be used to engage children in active work, develop their cognitive interests, enhance classroom management, and promote better learning in primary school [29]. To meet students' information needs,

learning must be poly sensory and varied. Consequently, future elementary school teachers must receive information training that activates their cognitive and creative potential and develops the expertise and knowledge required for future professional action. Digital tools will enhance teacher education by allowing teachers to present scientific information in a different way, individualize learning, and increase student-teacher interaction [30]. Additionally, the authors propose the following hypothesis: ELT in-service teachers' ICT integration will be tied to digital tools use (H4).

Technology acceptance model 3 (TAM3) and will-skill-tool (WST) models were used to create the research model. Figure 1 shows that there is one dependent variable and four independent ones. All the hypotheses were based on this research.

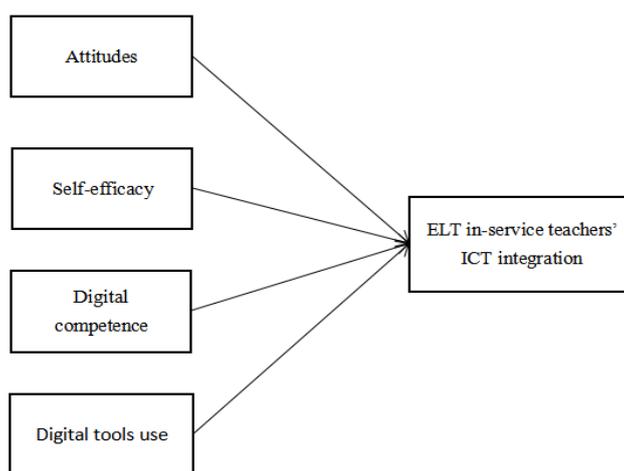


Figure 1. Research model

2. RESEARCH METHOD

The study model was fitted with the partial least squares structural equation modeling (PLS-SEM) to investigate how the latent factors are connected. Reliability, convergent validity, and discriminant validity tests were conducted to validate the study model [31]. Sample used in this study comprised of English language teachers in China's Henan Province because the study's focus was on the integration of ICT by ELT in-service teachers. The sample was chosen using the probability sampling method known as snowball sampling. Through an online platform, 1,250 questionnaires were made available, and we were able to collect 1216 samples. This whole sample is sufficient to reflect the population [31].

From which the structured questionnaire was modified [32]–[36]. There were five latent constructs—attitudes, self-efficacy, digital competence, tool use, and ELT in-service teachers' ICT integration—are measured by a questionnaire that uses a five-point Likert scale (1=strongly disagree to 5=strongly agree). Questionnaire star was used to generate the survey, and the link was sent by email and various messaging platforms including WeChat and QQ.

3. RESULTS AND DISCUSSION

The data was analyzed using the Smart PLS 3 software. The measurement model (Cronbach's alpha, loading, composite reliability (CR), and average variance extracted (AVE)) must be examined as part of the PLS-SEM technique. In the final phase (path analysis), the structural model must be determined [37].

3.1. Measurement model evaluation

When assessing a measurement model, reliability and validity are the two primary criteria. Table 1 shows assessment of construct elements' consistencies via reliability test. The validity test shown in Tables 2 and 3 was used to examine the convergent validity and discriminant validity of the construct. Each latent component's Cronbach's alpha value is shown in Table 1.

Based on the findings, all latent constructs were considered credible because their Cronbach's alpha values exceeded the cutoff point of 0.6. Values between 0.7 and 0.8 are considered good, while those between 0.7 and 0.7 are considered adequate [37]. Also, since the loading values were all greater than 0.7, each latent construct had the same number of items at the end as at the beginning.

Table 1. Reliability test (Cronbach's alpha)

Constructs	Measurement items	Cronbach's alpha	Number of items
Attitudes	AT1, AT2, AT3, AT4, AT5, AT6	0.916	6(6)
Self-efficacy	SE1, SE2, SE3, SE4, SE5, SE6, SE7, SE8, SE9, SE10, SE11, SE12, SE13, SE14, SE15, SE16, SE17, SE18, SE19	0.914	19(19)
Digital competence	DC1, DC2, DC3, DC4, DC5, DC6, DC7, DC8, DC9, DC10	0.928	10(10)
Digital tools use	DTU1, DTU2, DTU3, DTU4, DTU5, DTU6, DTU7, DTU8, DTU9, DTU10	0.929	10(10)
ELT in-service teachers' ICT integration	ICTI1, ICTI2, ICTI3, ICTI4, ICTI5, ICTI6, ICTI7, ICTI8, ICTI9, ICTI10	0.913	10(10)

Table 2. Convergent validity of measurement model

Constructs	Items	Loading	CR	AVE	Constructs	Items	Loading	CR	AVE
Attitudes	AT1	0.836	0.935	0.705	Digital competence	DC3	0.838	0.940	0.611
	AT2	0.846				DC4	0.843		
	AT3	0.840				DC5	0.840		
	AT4	0.835				DC6	0.853		
	AT5	0.836				DC7	0.854		
	AT6	0.843				DC8	0.841		
Self-efficacy	AT6	0.843	0.933	0.699	Digital tools use	DC9	0.853	0.928	0.821
	SE1	0.857				DC10	0.864		
	SE2	0.872				DTU1	0.852		
	SE3	0.853				DTU2	0.861		
	SE4	0.847				DTU3	0.873		
	SE5	0.881				DTU4	0.865		
	SE6	0.884				DTU5	0.859		
	SE7	0.869				DTU6	0.865		
	SE8	0.873				DTU7	0.856		
	SE9	0.891				DTU8	0.864		
	SE10	0.892				DTU9	0.867		
	SE11	0.882				DTU10	0.866		
	SE12	0.881				ELT in-service teachers' ICT integration	ICTI1		
SE13	0.887	ICTI2	0.819						
SE14	0.866	ICTI3	0.842						
SE15	0.879	ICTI4	0.832						
SE16	0.878	ICTI5	0.817						
SE17	0.888	ICTI6	0.818						
SE18	0.884	ICTI7	0.829						
SE19	0.886	ICTI8	0.834						
Digital competence	DC1	0.838	0.939	0.847	ICTI9	0.829	0.928	0.821	
	DC2	0.836			ICTI10	0.825			

As per Table 2, composite reliability was all greater than 0.7, and AVE values were all greater than 0.5, which is consistent with prior research. Thus, it was determined that the constructs' convergent validity. Next, the measures' discriminant validity was evaluated utilizing Fornell and Larcker method. In this approach, the correlation between latent variables is compared to the square root of the AVE of the latent variable [31]. Each diagonal value was greater than the remaining correlation values, as seen in Table 3. The discriminant validity was met as a result.

Table 3. Discriminant validity of measurement model

	AT	DC	DTU	ICTI	SE
AT	0.839				
DC	0.653	0.779			
DTU	0.636	0.645	0.782		
ICTI	0.688	0.683	0.696	0.750	
SE	0.535	0.562	0.593	0.648	0.733

3.2. Structural model evaluation

The structural model evaluation took three aspects into account: the interrelationships between the components, the validity of the structural model, and the consistency of each predictor in terms of ELT in-

service teachers' ICT integration. The route coefficient analysis (t value and coefficient) and effect sizes (f^2) were used to assess the strength of each predictor given in Table 4 [32]. The coefficient of determination (R^2) was also used to assess the validity of the structural model presented in Figure 2.

Table 4. Path coefficient and hypothesis testing

Hypothesis	Relationship	Coefficient	t value	Decision	f^2
H1	Attitudes -> ICT integration	.258	13.515**	Supported	.093
H2	Self-efficacy -> ICT integration	.238	13.226**	Supported	.065
H3	Digital competence -> ICT integration	.220	9.821**	Supported	.082
H4	Digital tools use -> ICT integration	.248	12.768**	Supported	.095

All the predictors of ELT in-service teachers' integration of ICT were examined, as shown in Table 4, and the results indicate that attitudes ($\beta=0.258$, $p<0.01$), self-efficacy ($\beta=0.238$, $p<0.01$), digital competence ($\beta=0.220$, $p<0.01$), and usage of digital tools ($\beta=0.248$, $p<0.01$) are the most significant. Since the p-values are less than 0.01, all the hypotheses (H1, H2, H3, and H4) are therefore supported.

Figure 2 depicts the R^2 as being 0.655. In other words, all the predictors in this model explained 65.50% of the overall variation in the integration of ICT by ELT in-service instructors. We looked at the impact sizes (f^2) to assess the potency of each predictor regarding ICT integration. Three effect sizes can be distinguished: tiny (0.02), middle (0.15), and large (0.35) [31]. All factors have modest effect sizes, according to the f^2 values.

The findings indicate that the attitudes, self-efficacy, digital competence, and use of digital tools of in-service English language instructors strongly influence their exposure to and use of ICT. Attitudes are the most influential component, followed by self-efficacy and the usage of digital tools, and then digital competence. The success of ICT integration is enhanced when teachers are positive about its potential [14]–[16]. Instructors who have confidence in their own technological talents are quite inclined to utilize it [20]. Instructors with a stronger understanding of digital tools seem to be more susceptible to utilizing them [23]. The study revealed that the utilization of digital tools greatly influences ICT integration [28], [29]. Due to the potential benefits of ICT in the classroom, the development and adoption of digital tools will play a vital part in bringing ICT into the mainstream. It is a vital component of a well-rounded English teaching strategy.

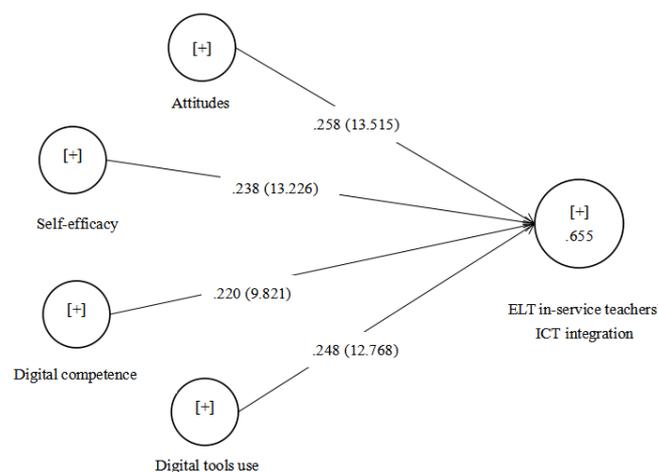


Figure 2. Result of path analysis

4. CONCLUSION

The elements influencing the incorporation of ICT by ELT in-service instructors were investigated in this study. Attitudes, self-efficacy, digital competence, and tool utilization are the hypotheses that have been put forth. We recruited participants for the study by distributing an online survey to 1,250 English teachers in the Chinese province of Henan; Of them, 1216 responded. The results show that all four factors have significant influences on ELT in-service teachers' ICT integration. Therefore, teacher attitudes, self-efficacy, digital competence, and digital tool use can all be used as reference factors to promote teacher ICT integration. Meanwhile, all four factors have small effective size. However, the smallest effective size is self-

efficacy. As teacher's self-efficacy is affected by many factors, such as their gender, age, work experience, attitude and digital ability, which will affect their self-efficacy, so teachers' self-efficacy is unstable. This further demonstrates the need for schools and policymakers to focus more on raising teachers' levels of self-efficacy in order to assist them in increasing the effectiveness of ICT use in the classroom.

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BIOGRAPHIES OF AUTHORS



Peng Ran     is a Ph.D. Candidate, Department of Curriculum and Instructional Technology, Faculty of Education, Universiti Malaya, Kuala Lumpur, Malaysia. Her research focuses on English language teaching, information and communication technology and curriculum design. She can be contacted at email: s2108648@um.edu.my.



Rafiza Abdul Razak     is an Associate Professor at the University of Malaya, Kuala Lumpur. Her interest in frugal innovation and creativity inspires her to design and develop several facilities at the Faculty of Education. She initiated industrial collaboration activities with Microsoft thus awarded 32 pre-service teachers with Microsoft Innovative Educator Trainer on top of that 17 of them Microsoft Innovative Educator Expert. Financially the department managed to gain its highest achievement. Thus, she initiated the Curriculum and Instructional Technology Department Research Grant Funding which awarded 10 research grants projects for members of the department. She can be contacted at email: rafiza@um.edu.my.



Siti Hajar Halili     is an Associate Professor at the University of Malaya, Kuala Lumpur. She is the Head of the Department of Curriculum & Instructional Technology. She was formerly with the Research Division, Prime Minister Department, Malaysia. She holds a Degree in Information System Management from the University Technology MARA, a master's in educational technology, and PhD. She can be contacted at email: siti_hajar@um.edu.my.