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Pedagogical Beliefs and Attitudes toward Information and Communication Technology:

A Survey of Teachers of English as a Foreign Language in China

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Abstract

Though pedagogical beliefs have been identified as critical factors in the success of technology integration, very few studies have included them in technology-adoption models. The present study revises the Technology Acceptance Model (TAM) by adding teachers' pedagogical beliefs, and tests the revised model among university-level English as a foreign language (EFL) teachers in China. Specifically, the revised model examines how teachers' constructivist and/or transmissive pedagogical beliefs influence four key constructs of the TAM: perceived usefulness, perceived ease of use, attitude toward use, and intention to use. Survey data were collected from 202 Chinese EFL teachers and analyzed using path analysis. The revised model showed a good model fit. The results indicated that the sampled teachers' pedagogical beliefs were more constructivist-oriented than transmissive-oriented, and that the former type of beliefs had a significant positive influence on three of the above-mentioned TAM constructs (perceived usefulness, perceived ease of use, and attitude toward use). Teachers' transmissive pedagogical beliefs, on the other hand, did not have any significant impact on their attitudes toward information and communication technology (ICT) or their perceptions of its usefulness, though such beliefs did significantly affect their perceptions of how easy ICT was to use. Implications of these findings for teacher education and professional training are discussed.

Keywords: Pedagogical beliefs; Perceived usefulness; Perceived ease of use; Attitude toward ICT; Constructivist beliefs; Transmissive beliefs; Chinese EFL teachers

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Introduction

The adoption of information and communication technology (ICT) by educators has long been a topic of discussion. Two recent large-scale international surveys (European Commission, 2013; Fraillon, Ainley, Schulz, Friedman, & Gebhardt, 2014) found that while teachers were more familiar with and had more confidence in using ICT now than they were five years previously, their active use of it was still limited and peripheral. Some scholars (e.g., Author, 2017a; Blackwell, Lauricella, Wartella, Robb, & Schomburg, 2013; Teo, 2014) have applied technology-adoption models to identify possible reasons for this slow integration among educators, while others have examined specific potential barriers to teachers' use of ICT in the classroom (Author, 2017b; Alkhawaldeh & Menchaca, 2014; Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Lin, Huang, & Chen, 2014). Of the many internal and external barriers identified, teachers' pedagogical beliefs stood out as having a significant influence on their effective use of ICT in teaching (Ertmer et al., 2012; Tondeur, Van Braak, Ertmer, & Ottenbreit-Leftwich, 2017). Nevertheless, few studies have included pedagogical beliefs in technology-adoption models. In addition, such models have often been tested without due regard for teachers' academic content areas, despite previous literature's findings that subject-matter culture influences the uptake or rejection of technology such as computers and the Internet in schools (e.g., Fraillon et al., 2014; Hennessy, Ruthven, & Brindley, 2005; Ravitz, Becker, & Wong, 2000). Conducting more studies that focus on teachers of a specific subject, such as foreign-language teachers, would thus advance our understanding of teachers' technology-related behaviors.

As compared with teachers of other subjects, foreign-language teachers have been found least inclined to use technology (e.g., Ravitz et al., 2000), and their technology adoption has been deemed slow and unproductive (Burston, 2014; Li & Walsh, 2011). In addition, the cultural background of language teachers, especially non-native speakers of the target language, can influence their teaching beliefs and practices (Hu, 2002), and could in turn influence their technology-integration behaviors (Ertmer & Ottenbreit-Leftwich, 2010). Few studies, however, have examined such effects among language teachers in or from Chinese cultural settings; and even fewer have identified the impact of Chinese language teachers' pedagogical beliefs on their levels of intention to use ICT in their language courses.

To address this knowledge gap, the present study examined the pedagogical beliefs, attitudes toward ICT, and intentions to use ICT held by Chinese teachers of English as a foreign language (EFL). More specifically, it incorporated pedagogical beliefs into Davis, Bagozzi and Warshaw's (1989) Technology Acceptance Model (TAM), and then examined the viability of the adapted model with a sample of university-level Chinese EFL teachers, in terms of how, if at all, those teachers' pedagogical beliefs influenced their attitudes toward ICT and subsequent intentions to use it. The following section reviews the prior literature on the TAM, other relevant models, and pedagogical beliefs, and then presents the present study's research questions and hypotheses.

Literature Review

The relationships of people's beliefs to their attitudes and behaviors have been discussed extensively in the field of social psychology. According to the conceptual framework proposed by Fishbein and Ajzen (1975), intentions to engage in certain behaviors are "a function of certain beliefs" (p. 15). More specifically, Ajzen held that people's beliefs have an influence on their

attitudes toward particular actions, which affect their intentions to perform such actions, and in the end, whether the actions occur (Fig. 1, below). This framework later became the basis of the Theory of Reasoned Action (TRA; Ajzen & Fishbein, 1980) and the Theory of Planned Behavior (TPB; Ajzen, 1991). According to both theories, people's attitudes toward and intention to engage in certain behaviors can be traced back to the influence of beliefs, which can therefore be seen as essential determinants of behavior.

[Insert Figure 1 here]

Teacher Beliefs

Like Ajzen, insofar as he built a connection between one's beliefs and behavior, Pajares (1992) argued that teachers' beliefs are vital to educational inquiry, as "the things and ways teachers believe" (p. 307) can help scholars understand their behavior better. Strong links between teachers' beliefs and their classroom behavior have been confirmed in both quantitative (e.g., Gil-Flores, Rodriguez-Santero, & Torres-Gordillo, 2017; Petko, 2012) and qualitative studies (e.g., Ertmer et al., 2012; Kim, Kim, Lee, Spector, & DeMeester, 2013). However, teacher beliefs are very hard to define, since "the construct of educational beliefs is itself broad" (Pajares, 1992, p. 315). Therefore, researchers need to be very clear about what specific set of teacher beliefs they intend to study.

Several kinds of teacher beliefs associated with technology use have been discussed in previous studies. They include beliefs about the nature of knowledge, known as epistemological beliefs (see Deng, Chai, Tsai, & Lee, 2014; Kim et al., 2013); the value placed on technology use (Mama & Hennessy, 2013; Petko, 2012); self-efficacy beliefs (Kreijns, Van Acker, Vermeulen, & Van Buuren, 2013; Mei, Brown, & Teo, 2017); and beliefs about teaching-and-learning or pedagogical beliefs (e.g., Ertmer et al., 2012; Gurcay, Wong, & Chai, 2013).

Pedagogical beliefs. In the existing literature, the definition of pedagogical beliefs is often bound up with specific teaching practices. For instance, when discussing the relationship of teachers' pedagogical beliefs to their computer use, Becker (2000b) proposed that traditional "transmission pedagogy" emphasizes "skill and knowledge transmission from teacher to students," whereas a constructivist pedagogical philosophy would focus on "attending to the 'meaningfulness' of instructional content" and "developing students' capacities to understand a subject" (p. 10). Chan and Elliot (2004) also discussed two distinct conceptions of teaching and learning, which they named *traditional* and *constructivist*: the first being rooted in behaviorism, and the second in constructivism. Teachers holding traditional (hereafter, *transmissive*) pedagogical beliefs tend to act as authorities in the classroom and to organize teacher-centered activities aimed at transmitting knowledge. Teachers who hold constructivist pedagogical beliefs, in contrast, act as facilitators in the classroom and encourage students to participate in active learning and construct meaning for themselves.

While transmissive and constructivist pedagogies might seem to be polar opposites, a given teacher's pedagogical beliefs cannot, in reality, be categorized solely as either. Rather, there is significant evidence that teachers can and do simultaneously hold these seemingly contradictory pedagogical beliefs, and alternate between student- and teacher-centered teaching practices (Crespo, 2016).

Pedagogical beliefs and technology-related behavior. Numerous empirical studies (e.g., Ertmer, 2012; Kim et al., 2013) have examined the relationship between teachers' beliefs and technology use, and found that teachers holding different pedagogical beliefs tended to integrate technology differently in their classrooms. A large-scale survey conducted by Becker (2000a), for example, found that teachers' pedagogical beliefs significantly influenced their decisions

about technology use, their choice of technology-related activities, and their selection of software to be used by their students. The same study also maintained that teachers whose pedagogy was constructivist were more likely to be attracted to Internet technology. In a different study, Becker (2000b) pointed out that constructivist approaches allowed students to be more active in using computers than a "standards-based, accountability-oriented approach" did (p. 51). In the sphere of language education, Meskill, Mossop, DiAngelo, and Padquale (2002) identified four ways that expert and novice teachers used technology differently, and one of the most important was pedagogy. When using technology, expert language teachers focused on empowering students and on the learning process, whereas novice ones focused on managing students and on the learning product.

Teachers' pedagogical beliefs have also been identified as one of the major barriers to technology integration (e.g., Ertmer, 2013; Hew & Brush, 2007). For instance, based on data from national surveys, Ertmer et al. (2012) pointed out that the external barriers to technology use had been "greatly reduced or even eliminated" (p. 424), and that the chronic ineffectiveness of technology integration indicated that a change in teachers' pedagogical beliefs – from traditional to constructivist – was necessary. Similarly, Windschitl and Sahl (2002) found that the positive influence of technology-rich environments on teachers who did not have constructivist pedagogical beliefs was very limited. Taken together, such findings appear to confirm that pedagogical beliefs would continue to be an obstacle to effective technology integration even if external barriers like limited access to technology and technical support were further reduced.

Attitudes toward Technology Use

According to Ajzen's conceptual framework (Ajzen, 1991; Ajzen & Fishbein, 1980), attitude works as a mediator between an individual's beliefs and his/her intention to engage in certain behavior. Therefore, a person's attitude toward a technology would have an influence on his/her intention to adopt it. Based on Ajzen's theories, Davis et al. (1989) proposed the TAM to help predict technology usage. Since then, the TAM has been widely tested in educational settings and verified as an effective model (Legris, Ingham, & Collerette, 2003), with many studies reporting attitude as a significant predictor of people's intention to use technology (e.g., Bas, Kubiatko, & Sunbul, 2016; Kreijns et al., 2013; Shin, Han, & Kim, 2014). Jeyaraj, Rottman, and Lacity's (2006) review of 11 models of technology adoption found that among 99 relevant studies, the TAM was "the most widely used model of individual IT adoption" (p. 14).

[Insert Figure 2 here]

Two key factors in the TAM are *perceived usefulness* and *perceived ease of use*, which refer respectively to a person's level of belief that his/her job performance will be enhanced through engagement with a system, and to the level of belief he/she has that using a system will be effortless (Davis et al., 1989). These two factors share similarities with factors in other models, including *relative advantage* and *complexity* in Moore and Benbasat's (1991) innovation-diffusion model, and *performance expectancy* and *effort expectancy* in the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003). However, Jeyaraj et al.'s (2006) review suggested that *perceived usefulness* and *perceived ease of use* were the most frequently used predictors of technology adoption, with the former being characterized as one of the best such predictors available.

Despite the TAM's wide use and confirmed effectiveness, very few studies have integrated teachers' pedagogical beliefs with technology adoption models or examined such

beliefs' relationships with teachers' attitudes toward technology and intention to use technology within a TAM framework. In the existing framework of the TAM, a person's attitude toward ICT is affected by his/her perceptions of its usefulness and of how easy it is to use. Yet this attitude, and subsequent intention to perform certain behaviors, might also be traceable back to his/her beliefs, in light of Ajzen's conceptualizations highlighted earlier (Ajzen, 1991; Ajzen & Fishbein, 1980). Hence, the present study set out to explore how teachers' pedagogical beliefs exert influences on their perceptions of the usefulness and ease of use of ICT, and/or on their attitudes toward and intention to use it.

Technology Use in Context

Teachers' use of technology for teaching and learning relies on "the cultural, social, and organizational contexts in which they live and work" (Somekh, 2008, p. 450). Thus, when discussing teachers' technology-related classroom behavior, it is useful to be very clear about what these contexts are.

Technology usage in language classrooms. The first context to consider is academic subject area. A *subject culture*, sometimes referred to as a subject-area subculture, has been defined by Goodson and Mangan (1995) as "the general set of institutionalized practices and expectations which have grown up around a particular school subject" (p. 615). According to the same authors, changes arising from the introduction of computers would be a challenge to these cultures, and in response, teachers might "return to the methods most compatible with their subject cultures and personal styles" (p. 627). Surveys have confirmed the importance of the subject or discipline to rates of ICT uptake in teaching (e.g., Becker, 2000a; Fraillon et al., 2014), and a close association among subject areas, teachers' beliefs, and technology use has also been reported (Hennessy et al., 2005; Howard, Chan, & Caputi, 2015).

In language education, though several models related to technology adoption have been proposed, they are either purely descriptive in nature or do not reflect the importance of pedagogical beliefs. Pennington (2004), for example, proposed a three-phase Innovation-Adoption Cycle (expansion of old forms, expansion of innovation, and transformation of forms) that did not explain language teachers' use of technology. Hsu (2016) showed that teachers' technological pedagogical content knowledge, together with the TAM, predicted their adoption of mobile-assisted language learning; but the extent to which pedagogical beliefs affected the use of technology remained unclear.

Foreign-language teachers have both external and internal motivations to use technology in their classes. The former might consist of encouragement or formal requirements. Oxford and Jung's (2007) review of five national guidelines found that all of them strongly emphasized technology integration in teacher-education programs. ACTFL's (2013) program standards for preparing foreign-language teachers required teacher-preparation programs to provide opportunities for teacher candidates to experience technology-enhanced teaching, with the aim of promoting their use of technology after graduation.

In terms of internal motivation, technology has been found to enhance the learning and teaching of many language skills, including grammar, vocabulary, reading, writing, pronunciation, listening, speaking, and cultural awareness (Levy, 2009). In addition, if used properly, technology can increase learners' interest in and access to their target languages, provide more opportunities for interaction and feedback, and enable improvements in the efficiency of teachers' organization and presentation of teaching content (Golonka, Bowles, Frank, Richardson, & Freynik, 2014). It is reasonable to expect that awareness of such phenomena and/or such findings would internally motivate language teachers to use technology.

Despite the many demonstrable benefits of technology integration in language teaching, and the level of motivation to adopt technology that can reasonably be expected of language teachers, the use of technology by language teachers has been limited and ineffective (Burston, 2014; Li & Walsh, 2011). Ravitz et al. (2000) reported that technology was less often used in foreign-language classrooms than in other academic subjects' classrooms because foreign-language teachers were more likely to use transmissive teaching methods. This view was recently echoed by Burston (2014, p. 115), who argued that foreign-language curricula were "limited" by traditional methodology, which had been "at variance with a constructivist, learner-centered methodology" for more than two decades. This seems to explain why Yang and Huang (2008), for example, found that language teachers were unable to effectively or productively use ICT in their work. Thus, it is imperative to investigate what hinders language teachers' technology adoption by applying models of such adoption that take their pedagogical beliefs into account.

Technology usage in Chinese culture. The second context to consider is that of culture, which is a "key variable" in technology use – though most cultures have not adopted "a definition of effective teaching that includes the notion of technology as an important tool for facilitating student learning" (Ertmer & Ottebreit-Leftwich, 2010, p. 264). While previous research on EFL teachers in China found that they had positive attitudes toward using computers in English teaching (He, Puakpong, & Lian, 2015), it also found that their technology use was limited to software such as PowerPoint for presenting "pictures, grammar and sentence structure" (Li & Walsh, 2011, p. 99); and the same pattern was still apparent several years later (Li, 2014).

There is "a whole set of expectations, attitudes, beliefs, values, perceptions, preferences, experiences, and behaviors that are characteristic of Chinese society with regard to teaching and

learning" (Hu, 2002, p. 96), and this needs to be taken into consideration when discussing teachers' technology use in that country. Hu (2005) argued that the traditional Chinese culture of teaching, which highlights an authoritative role for the teacher, conflicts fundamentally with learner-centered methodology. Technology use has been found to represent a major challenge for teachers who hold traditional pedagogical beliefs and/or who favor teacher-centered methodology (e.g., Ertmer et al., 2012). From the perspective of effective technology integration, there thus appears to be a discordance between the "teacher-centered, textbook-directed and exam-oriented" English-language classes in China and the Chinese Ministry of Education's requirement that language teaching be more student-centered and communication-oriented, with the wider goals of communicative and intercultural competence (Li, 2014, p. 107). On the other hand, as Hu (2005) also noted, the Chinese culture of teaching and learning described above might also be changing, especially in more developed coastal areas of the Mainland, due to sociocultural influences from other countries where teacher-centered and constructivist-oriented pedagogies are advocated.

While many of the studies reviewed above have investigated teachers' technology use or barriers to that use, few if any have examined how the pedagogical beliefs held by teachers of foreign languages in China affect their attitudes toward technology, their intention to use it, or their actual classroom use of it. The present study therefore was designed to investigate what kind(s) of pedagogical belief Chinese teachers of foreign languages hold, and how such beliefs influence their attitudes toward technology adoption and technology behavior in the classroom.

More specifically, this study focused on how teachers' core pedagogical beliefs (i.e., transmissive and constructivist) impact on their perceptions of ICT's usefulness and ease of use, and on their attitudes toward using ICT, to assess the effectiveness of the TAM in the specific

context of foreign-language teachers' instructional-technology use in China. Based on the research model shown in Fig. 3, this study was guided by the following three research questions and nine hypotheses:

[Insert Figure 3 here]

RQ1: Do Chinese EFL teachers' constructivist pedagogical beliefs have a positive influence on their perceptions of ICT's ease of use and usefulness, and/or their attitudes toward ICT use?

Three hypotheses (H1-H3, as shown in Fig. 3) are related to this research question.

H1: Chinese EFL teachers' constructivist pedagogical beliefs positively predict their perceptions that ICT is easy to use.

H2: Chinese EFL teachers' constructivist pedagogical beliefs also positively predict their perceptions that ICT is useful.

H3: Chinese EFL teachers with higher levels of constructivist pedagogical belief are more likely to hold positive attitudes toward ICT.

RQ2: Do Chinese EFL teachers' transmissive pedagogical beliefs have a negative influence on their perceptions of ICT's ease of use and usefulness, and/or their attitudes toward ICT use?

As shown in Fig. 3, H4, H5, and H6 are related to this question.

H4: Chinese EFL teachers' traditional pedagogical beliefs negatively predict their perceptions that ICT is easy to use.

H5: Chinese EFL teachers' traditional pedagogical beliefs negatively predict their perceptions that ICT is useful.

H6: Chinese EFL teachers with higher levels of traditional pedagogical belief are more likely to hold negative attitudes toward ICT.

RQ3: Do Chinese EFL teachers' perceptions that ICT is easy to use and useful positively influence their attitudes toward ICT? And do teachers' attitudes toward ICT positively influence their intention to use it?

Three hypotheses relate to this question.

H7: Chinese EFL teachers' perceptions that ICT is easy to use have a positive impact on their attitudes toward it.

H8: Chinese EFL teachers' perceptions that ICT is useful have a positive influence on their attitudes toward it.

H9: Chinese EFL teachers' attitudes toward ICT have a positive impact on their intention to use it.

Methods

Participants

EFL teachers ($N = 202$) from several universities in a coastal city in Southern China participated in the current study. They included 38 males and 164 females. Most ($N = 139$, or 68.8%) indicated that they were aged between 30 and 45. All had a master's degree ($N = 181$) or a doctoral degree ($N = 21$) related to language education (e.g., applied linguistics). Just over three-fifths of the participants ($N = 126$, or 62.4%) reported not having any online teaching experience.

Measures

Data were collected using a questionnaire that asked the teachers to report their pedagogical beliefs, perceptions of ICT's usefulness and ease of use, attitudes toward it, and

intention to use it. The questionnaire was a version of those used by Teo (2010) and Chan and Elliot (2004), modified to suit the special circumstances of the language teachers who participated in the current study.

The questionnaire comprised 29 items divided into seven sections. Apart from four multiple-choice items in the first section, which were included to elicit the participants' background information as reported above, all items were presented as statements and rated by the participants on a five-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree. The items, which were originally in English, were translated into Chinese by the lead author, and the translations verified by the other authors before they were administered to the participants. All authors are native Chinese speakers with native-like English proficiency. The 25 Likert-scaled items can be found (in their English versions) in Appendix A.

As shown in the appendix, four items were designed to elicit teachers' perceptions of the usefulness of ICT (*perceived usefulness [PU]*); four others covered teachers' perceptions of how easy it is to use ICT (*perceived ease of use [PEU]*); four more focused on participants' attitudes toward ICT (*attitudes toward ICT use [ATCU]*); and three examined teachers' intention to use ICT in language teaching (*intention to use [IU]*). The remaining 10 Likert-scaled items focused on teachers' pedagogical beliefs, with five covering *constructivist pedagogical belief (CPB)* and the other five, *transmissive pedagogical belief (TPB)*.

Cronbach's alpha results for the six scales described above were .765 (PU), .763 (PEU), .787 (ATCU), .801 (IU), .820 (CPB), and .871 (TPB), which, according to George and Mallery (2003, p. 231), indicated acceptable (> .7) or good (> .8) internal consistency reliability for each scale.

Data Collection Procedure and Analysis

The questionnaire was administered online through Qualtrics. English-language teachers in several universities were contacted initially to gauge their interest in the study. Those who indicated a willingness to participate were subsequently sent a web link to the questionnaire via email.

For data analysis, descriptive statistics and basic correlations of the variables were first examined. The variables were represented by the means of the aggregated scores of their corresponding survey items. Path analysis was then conducted, using STATA 13.0, to assess the statistical significance of the path coefficients among the variables, and to validate the proposed model (see Fig. 3). Path analysis, a special type of Structural Equation Modeling (Raykov & Marcoulides, 2006), was chosen because it allows simultaneous testing of the magnitude as well as the significance of the complex predictive relationships among a set of variables such as those embodied in the research questions of this study.

Results

Descriptive Statistics

As shown in Table 1, the participants' levels of agreement with the two types of pedagogical belief differed markedly. Their mean score for CPB was 4.498 (close to 5, "strongly agree"), indicating these teachers' overall positive response to constructivist pedagogical beliefs, whereas they gave TPB a mean score of 2.334 (close to 2, "disagree"), indicating a negative response to transmissive ones.

The participants generally had positive perceptions of ICT. They gave PU a mean score of 4.167 (slightly above "agree"), indicating their positive attitudes towards ICT's usefulness; while PEU scored 3.327 (between 3, "neither disagree nor agree" and 4, "agree"), indicating their shared perception that technology was reasonably easy to use.

The participants also had a positive attitude toward ICT use, with the mean score for ATCU being 4.039 (close to 4, "agree"). In addition, they expressed strong intentions to use ICT, as evidenced by the mean score for IU being 4.238 (between "agree" and "strongly agree"). The standard deviation ranged from .458 to .784, reflecting narrow spreads in the participants' response choices. All items showed skewness or kurtosis values between 2 and -2, indicating the univariate normality of the data.

[Insert Table 1 here]

Correlations

Pearson correlation analysis was conducted to provide initial information about the relationships between the variables. As shown in Table 2, the factors from the TAM (PU, PEU, ATCU and IU) were significantly and positively correlated with each other (PU and PEU: r = .158, p = .038; PU and ATCU: r = .534, p < .001; PEU and ATCU: r = .319, p < .001). PU and PEU were also both significantly correlated with ATCU at the p < .001 level; and IU was significantly correlated with PU, PEU, and ATCU (r = .378, .259, and .442, respectively; all p < .001).

CPB was significantly and positively correlated with three factors in the TAM (CPB and PU: r = .264, p < .01; CPB and PEU: r = .239, p < .01; CPB and ATCU: r = .335, p < .001), except with IU (r = .073, p = .331). TPB, on the other hand, was only significantly and positively correlated with PU (r = .294, p < .001). Its correlations with the other three factors of the TAM were also positive, but none achieved significance (TPB and PU: r = .128, p = .095; TPB and ACTU: r = .088, p = .250; TPB and IU: r = .127 p = .093).

[Insert Table 2 here]

Path Analysis

Path analysis was subsequently conducted to test the statistical significance of the predictive relationships among the variables in the path diagram shown in Fig. 3. The model results were: $\chi^2 (2) = .751$, $p = .386$; SRMR = .019; CFI=1.000; and RMSEA= .000. Hu and Bentler (1999) suggested that fit-index values over .90 for CFI or less than .08 for RMSEA and SRMR indicate a good model fit; and the conceptual model used here met these criteria.

The estimates of the path coefficients and the results of significance testing are presented in Table 3 and Fig. 4. In the former, of the nine path coefficients (corresponding to the nine examined hypotheses), seven were found to be statistically significant. Specifically, CPB had a positive influence on the respondents' perceptions of ICT's ease of use and usefulness, as well as on their attitudes toward using it ($\beta = .236$, $p < .001$; $\beta = .263$, $p < .001$; $\beta = .163$, $p < .05$; respectively). TPB, in contrast, had no significant unique effect on these teachers' perceptions of ICT's usefulness ($\beta = .125$, $p = .082$) or on their attitudes toward it ($\beta = -.037$, $p = .569$). However, TPB did significantly and positively influence the respondents' perceptions of technology's ease of use ($\beta = .292$, $p < .001$). Lastly, the participants' attitudes toward ICT use (ATCU) were found to be significantly predicted by both their perceptions that it was easy to use ($\beta = .220$, $p = .001$) and useful ($\beta = .464$, $p < .001$); and ATCU also had a significant positive influence on their intention to use ICT ($\beta = .381$, $p < .001$).

[Insert Table 3 here]

[Insert Figure 4 here]

Discussion

This study modified the TAM by incorporating teachers' pedagogical beliefs (i.e., transmissive and constructivist), and used the resulting revised model to examine the relationships among Chinese EFL teachers' pedagogical beliefs, their attitudes toward ICT, and

their intentions to use ICT. Overall, the collected data supported the validity of the revised TAM, and most of the proposed hypotheses were confirmed. These results imply that pedagogical beliefs are a useful addition to TAM-based studies of teachers.

Constructivist Pedagogical Beliefs and Attitudes toward Technology

RQ1 examined the effect of CPB on PEU (H1), PU (H2), and ATCU (H3), and these three hypotheses were all supported by the data, indicating that the constructivist beliefs of this study's participants had a positive influence on their perceptions of ICT, as being easy to use (H1), as being useful (H2), and in general (H3). These results corroborate Becker's (2000b) finding of a positive relationship between teachers' constructivist teaching philosophy and their computer use, in that his participants who reported using software more frequently had "consistently more constructivist philosophies than the average teacher" (p. 16). The present findings are also in line with Ertmer's (2012) argument that, if teachers are to integrate technology more effectively, a change from traditional transmissive pedagogy to constructivist pedagogy will be necessary. In view of the significant relationships the present study found between the components of the TAM (discussed below), it can be said that teachers' attitudes toward ICT, their subsequent intentions to use it, and/or their actual use of it could also be driven by CPB *indirectly*, i.e., mediated by their perceptions of technology's usefulness and ease of use (see Fig. 4).

The results from RQ1 demonstrate the importance of understanding teachers' pedagogical beliefs, as these individuals are more responsible than anyone else for the integration of technology into teaching practices. Additionally, teachers' constructivism has also been closely linked to their active, innovative use of technology in instruction (e.g., Ertmer, 2012; Petko, 2012). Given the reported problems surrounding ICT use by teachers – e.g., that there was

no significant improvement in their active use of ICT between 2008 and 2013 (European Commission, 2013) – it is imperative for researchers to focus more on the origins of, nature of, and changes in teachers' pedagogical beliefs, if they are to facilitate advanced use of ICT in teaching practice.

Transmissive Pedagogical Beliefs and Attitudes toward Technology

For RQ2, regarding the effect of transmissive beliefs on teachers' attitudes, none of the three hypotheses (H4-H6) were supported. Specifically, H4 proposed that a significant negative influence of transmissive pedagogical beliefs on the teachers' perceptions of ICT's ease of use would be found, but in fact this influence was positive but non-significant. H5 proposed that TPB would have a negative influence on ICT's perceived usefulness; the path coefficient, however, was positive but non-significant. And in the case of H6, a negative path coefficient from TPB to attitudes toward ICT use appeared to indicate a negative influence, but the effect was not significant.

The authors of the present study speculate that these "surprises" might be related to a finding of Becker's (2000b): that is, while teachers with traditional beliefs tended to use technology in a more traditional way than their constructivist counterparts, they were nevertheless more constructivist than those who did not use technology at all. Such results should focus researchers' attention on the idea of active, meaningful, and innovative use of technology. As discussed earlier in the Introduction section of this paper, an international survey of 35,000 teachers by Fraillon et al. (2014) found that the respondents were making extensive use of technology and generally thinking positively about it, and yet that they often employed ICT for relatively simple tasks (e.g., word processing and presentations) rather than more complex ones such as creating e-portfolios (4% of usage) and digital games (5%). Likewise, Li

(2014) found that computer use by language teachers in China was often restricted to presenting information using PowerPoint, even though these teachers did not have negative attitudes toward technology. Therefore, due attention needs to be paid to teachers who express positive feelings about ICT, yet continue to use it in a traditional way that may not benefit, and may even harm, student-centered learning processes.

Another reason for the lack of support for this paper's TPB-related hypotheses might be that the respondents were much more constructivist-oriented than transmissive-oriented (see Table 1), which in turn might be related to their geographical location in a developed, coastal area in Southern China notably influenced by the western world (Hu, 2005). As such, their very low levels of transmissive orientation could have resulted in the failure of any potential negative influence of attitudes toward technology to emerge. In other words, the findings will not necessarily be generalizable to teachers in other regions, even within China.

Ease of Use, Usefulness, Attitude toward ICT, and Intention of ICT Use

A secondary purpose of this study, represented by RQ3, was to test the TAM in the specific context of EFL teaching in China. The three hypotheses related to this research question were all supported by the data. In the cases of H7 and H8, teachers' attitudes toward ICT were significantly driven by their perceptions that it was useful and easy to use. Meanwhile, their attitudes toward ICT also had significant impacts on their intention to use it (H9). These findings, in line with those of many previous studies, confirmed that perceived usefulness and perceived ease of use are important factors to consider, and that the TAM could be effectively used to examine teachers' attitudes toward technology and their technology use in diverse educational settings (Haines, 2015; Legris et al., 2003; Stockwell, 2009). Haines, for example, asserted that language teachers had to recognize the affordances of technological tools before they could

actually use them in their teaching; similarly, Stockwell (2009) reported that language teachers' initial choices of tools for teaching were normally those they were already familiar with.

Conclusion

By incorporating pedagogical beliefs into the TAM, this study on university EFL teachers in China has made a significant contribution to the scholarly literature on teachers' technology adoption. Taken as a whole, this paper's findings suggest that the modified version of the TAM it proposed could be effective in explaining teachers' technology integration in broader and more diverse contexts. In the present research, the Chinese EFL teachers' pedagogical beliefs were more constructivist-oriented than transmissive-oriented, and their constructivist beliefs had significant positive influences on their perceptions of ICT's usefulness and ease of use, as well as their attitudes toward it. Their transmissive beliefs, meanwhile, did not have the predicted significant negative influence on their attitude toward ICT.

A major implication of this study is that various stakeholders now have a new method for understanding the important role of teachers' pedagogical beliefs (i.e., transmissive versus constructivist) in their technology integration. The answers to RQ1 demonstrate the importance of constructivist beliefs, and confirm that a shift in the direction of this type of pedagogical belief could yield more positive attitudes toward ICT, and hence more innovative use of it in education. The unsupported hypotheses in relation to RQ2, on the other hand, imply that while teachers may have positive attitudes toward ICT, their use of it might still be restrained due to their traditional transmissive beliefs. It is therefore essential to understand how and why teachers with differing pedagogical beliefs will embrace technology use in different ways and to different degrees.

The present findings should be of particular interest to pre-service teacher educators designing or developing courses related to technology integration. To facilitate effective

technology integration among teachers, teacher educators should pay special attention to inculcating novice teachers with constructivist pedagogical beliefs, and taking such beliefs into consideration in course design. Implications can also be discerned regarding in-service teachers' professional development, the technology-training aspects of which should integrate more beliefs-related content, as opposed to the prevailing focus on the use of specific items of hardware and software. In addition, as Nami, Marandi, and Sotoudehnama (2016) noted, it is very important to help language teachers understand the potential pedagogical uses of technology.

The present study is subject to several limitations that should be noted. First, the survey questions concerning pedagogical beliefs may stand in need of improvement, as the 10 questions in the instrument only captured a limited set of features for each pedagogical belief type. Measuring a broader set of beliefs would undoubtedly sharpen the results. Second, at just over 200 people, the sample was not large, and may not have adequately reflected China's high variability in socio-economic status from region to region. The fact that this study's respondents were all teachers from universities in a coastal area may further limit the generalizability of its results, as pointed out earlier as part of the discussion of the influences of pedagogical beliefs. Lastly, while this study found that Chinese EFL teachers' pedagogical beliefs were more constructivist-oriented, it was not able to measure whether their actual ICT-related behavior was more constructivist- or transmissive-based. Integrating technology into classroom practice in a constructivist way may pose a challenge to many language teachers. As indicated by previous findings (e.g., Basturkmen, 2012), the beliefs teachers espouse often do not agree with their technology-related behavior. Therefore, future studies could usefully investigate how closely teachers' beliefs are aligned with their behaviors in the sphere of technology integration.

References

Author, 2017a

Author, 2017b

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211. doi: 10.1016/0749-5978(91)90020-T

Alkhawaldeh, N., & Menchaca, M. (2014). Barriers to utilizing ICT in education in Jordan. *International Journal on E-learning*, *13*(2), 127–155.

American Council on Teaching of Foreign Languages (ACTFL). (2013). *Program standards for the preparation of foreign language teachers*. Retrieved from https://www.actfl.org/sites/default/files/pdfs/ACTFL-Standards20Aug2013.pdf

Baş, G., Kubiatko, M., & Sünbül, A. M. (2016). Teachers' perceptions towards ICTs in teaching-learning process: Scale validity and reliability study. *Computers in Human Behavior, 61*, 176–185. doi:10.1016/j.chb.2016.03.022

Basturkmen, H. (2012). Review of research into the correspondence between language teachers' stated beliefs and practices. *System*, *40*(2), 282–295.

Becker, H. (2000a). Internet use by teachers. In R. Pea (Ed.), *The Jossey-Bass reader on technology and learning* (pp. 80–111). San Francisco, CA: Jossey-Bass Inc.

Becker, H. (2000b). Findings from the teaching, learning and computing survey: Is Larry Cuban right? *Educational Policy Analysis Archives, 8*(51). Retrieved from http://epaa.asu.edu/ojs/article/view/442

Blackwell, C. K., Lauricella, A. R., Wartella, E., Robb, M., & Schomburg, R. (2013). Adoption and use of technology in early education: The interplay of extrinsic barriers and teacher attitudes. *Computers & Education, 69*, 310–319. doi: 10.1016/j.compedu.2013.07.024

Burston, J. (2014). The reality of MALL: Still on the fringes. *CALICO Journal*, *31*(1), 103–125.

Chan, K. W., & Elliott, R. G. (2004). Relational analysis of personal epistemology and conceptions about teaching and learning. *Teaching and Teacher Education*, *20*(8), 817–831.

Crespo, S. (2016). Truth, lies, and videotapes: Embracing the contraries of mathematics teaching. *The Elementary School Journal*, *117*(1), 101–118.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two. *Management Science, 35*(8), 982–1003.

Deng, F., Chai, C. S., Tsai, C., & Lee, M. (2014). The relationships among Chinese practicing teachers' epistemic beliefs, pedagogical beliefs and their beliefs about the use of ICT. *Journal of Educational Technology & Society, 17*(2), 245–256.

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, *42*(3), 255–284.

Ertmer, P. A., & Ottenbreit-Leftwich, A. (2013). Removing obstacles to the pedagogical changes required by Jonassen's vision of authentic technology-enabled learning. *Computers & Education*, *64*, 175–182.

Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education, 59*, 423–435. doi: 10.1016/j.compedu.2012.02.001

European Commission. (2013). *Survey of schools: ICT in education. Benchmarking access, use and attitudes to technology in Europe's schools* (final report). Brussels, Belgium: Author. Retrieved from https://ec.europa.eu/digital-single-market/sites/digital-agenda/files/KK-31-13-401-EN-N.pdf

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research.* Reading, MA: Addison-Wesley.

Fraillon, J., Ainley, J., Schulz, W., Friedman, T., & Gebhardt, E. (2014). *Preparing for life in a digital age*: *The IEA International Computer and Information Literacy Study International Report.* ICILS 2013, IEA, and Springer Open.

Gil-Flores, J., Rodríguez-Santero, J., & Torres-Gordillo, J. J. (2017). Factors that explain the use of ICT in secondary-education classrooms: The role of teacher characteristics and school infrastructure. *Computers in Human Behavior*, 68, 441–449.

Golonka, E. M., Bowles, A. R., Frank, V. M., Richardson, D. L., & Freynik, S. (2014). Technologies for foreign language learning: A review of technology types and their effectiveness. *Computer Assisted Language Learning: An International Journal, 27*(1), 70–105. doi:10.1080/09588221.2012.700315

Gurcay, D., Wong, B., & Chai, C. S. (2013). Turkish and Singaporean pre-service physics teachers' beliefs about teaching and use of technology. *The Asia-Pacific Education Researcher*, *22*(2), 155–162.

Goodson, I. F., & Mangan, J. M. (1995). Subject cultures and the introduction of classroom computers. *British Educational Research Journal, 21*(5), 613–629.

Haines, K. J. (2015). Learning to identify and actualize affordances in a new tool. *Language Learning & Technology*, *19(1)*, 165–180. Retrieved from http://llt.msu.edu/issues/february2015/haines.pdf

He, B., Puakpong, N., & Lian, A. (2015). Factors affecting the normalization of CALL in Chinese senior high schools. *Computer Assisted Language Learning*, *28*(3), 189–201.

Hennessy, S., Ruthven, K., & Brindley, S. (2005). Teacher perspectives on integrating ICT into subject teaching: Commitment, constraints, caution, and change. *Journal of curriculum studies*, *37*(2), 155–192.

Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development*, *55*(3), 223–252.

Howard, S. K., Chan, A., & Caputi, P. (2015). More than beliefs: Subject areas and teachers' integration of laptops in secondary teaching. *British Journal of Educational Technology*, *46*(2), 360–369.

Hsu, L. (2016). Examining EFL teachers' technological pedagogical content knowledge and the adoption of mobile-assisted language learning: A partial least square approach. *Computer Assisted Language Learning*, *29*, 1287–1297. doi: 10.1080/09588221.2016.1278024

Hu, G. (2002). Potential cultural resistance to pedagogical imports: The case of communicative language teaching in China. *Language, Culture and Curriculum*, *15*(2), 93–105.

Hu, G. (2005). Contextual influences on instructional practices: A Chinese case for an ecological approach to ELT. *TESOL Quarterly*, *39*(4), 635–660.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55.

Jeyaraj, A., Rottman, J. W., & Lacity, M. C. (2006). A review of the predictors, linkages, and biases in IT innovation adoption research. *Journal of Information Technology*, *21*(1), 1–23.

Kim, C., Kim, M. K., Lee, C., Spector, J. M., & DeMeester, K. (2013). Teacher beliefs and technology integration. *Teaching and Teacher Education 29*, 76–85. doi: 10.1016/j.tate.2012.08.005

Kreijns, K., Van Acker, F., Vermeulen, M., & Van Buuren, H. (2013). What stimulates teachers to integrate ICT in their pedagogical practices? The use of digital learning materials in education. *Computers in human behavior, 29*(1), 217–225.

Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & Management*, *40*(3), 191–204.

Levy, M. (2009). Technologies in use for second language learning. *The Modern Language Journal*, *93*(s1), 769–782.

Li, L., & Walsh, S. (2011). Technology uptake in Chinese EFL classes. *Language Teaching Research*, *15*(1), 99–125.

Li, L. (2014). Understanding language teachers' practice with educational technology: A case from China. *System*, *46*, 105–119.

Lin, C.-Y., Huang, C.-K., & Chen, C.-H. (2014). Barriers to the adoption of ICT in teaching Chinese as a foreign language in US universities. *ReCALL*, *26*, 100–116. doi: 10.1017/S0958344013000268

Mama, M., & Hennessy, S. (2013). Developing a typology of teacher beliefs and practices concerning classroom use of ICT. *Computers & Education*, 68, 380–387.

Mei, B., Brown, G. T., & Teo, T. (2017). Toward an understanding of preservice English as a Foreign Language teachers' acceptance of Computer-Assisted Language Learning 2.0 in the People's Republic of China. *Journal of Educational Computing Research*. OnlineFirst. doi: 10.1177/0735633117700144

Meskill, C., Mossop, J., DiAngelo, S., & Pasquale, R. K. (2002). Expert and novice teachers talking technology: Precepts, concepts, and misconcepts. *Language Learning & Technology*, *6*(3), 46–57. Retrieved from http://llt.msu.edu/vol6num3/meskill/

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research*, *2*(3), 192–222.

Nami, F., Marandi, S. S., & Sotoudehnama, E. (2016). CALL teacher professional growth through lesson study practice: An investigation into EFL teachers' perceptions. *Computer Assisted Language Learning*, *29*, 658–682. doi:10.1080/09588221.2015.1016439

Oxford, R. L., & Jung, S. (2007) National guidelines for technology integration in TESOL programs: Factors affecting (non)implementation. In M. A. Kassen, R. Z., Lavine, K. Murphy-Judy, & M. Peters (Eds.), *Preparing and developing technology-proficient L2 teachers* (pp. 23–48). San Marcos, TX: CALICO.

Pajares, M. F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, *62*(3), 307–332.

Pennington, M. C. (2004). Cycles of innovation in the adoption of Information Technology: A view for language teaching. *Computer Assisted Language Learning*, *17*, 7–33. doi: 10.1076/call.17.1.7.29705

Petko, D. (2012). Teachers' pedagogical beliefs and their use of digital media in classrooms: Sharpening the focus of the 'will, skill, tool' model and integrating teachers' constructivist orientations. *Computers & Education*, *58*(4), 1351–1359.

Ravitz, J. L., Becker, H. J., & Wong, Y. (2000). *Constructivist-compatible beliefs and practices among US Teachers. Teaching, Learning, and Computing: 1998 National Survey Report# 4.* Center for Research on Information Technology and Organizations, University of California, Irvine & University of Minnesota.

Raykov, T., & Marcoulides, G. A. (2006). *A first course in structural equation modeling* (2nd Ed.). Mahwah, NJ: Erlbaum.

Shin, W. S., Han, I., & Kim, I. (2014). Teachers' technology use and the change of their pedagogical beliefs in Korean educational context. *International Education Studies*, *7*(8), 11–22.

Somekh, B. (2008). Factors affecting teachers' pedagogical adoption of ICT. In J. Voogt & G. Knezek (Eds.), *International handbook of information technology in primary and secondary education* (pp. 449–460). The Netherlands: Springer.

Stockwell, G. (2009). Teacher education in CALL: Teaching teachers to educate themselves. *Innovation in Language Learning and Teaching*, *3*(1), 99–112. doi: 10.1080/17501220802655524

Teo, T. (2011). Factors influencing teachers' intention to use technology: Model development and test. *Computers & Education, 57*, 2432–2440. doi:10.1016/j.compedu.2011.06.008

Teo, T. (2014). Unpacking teachers' acceptance of technology: Tests of measurement invariance and latent mean differences. *Computers & Education*, 75, 127–135. doi: 10.1016/j.compedu.2014.01.014

Tondeur, J., van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: a systematic review of qualitative evidence. *Educational Technology Research and Development*, 65, 555–575.

Venkatesh, V., Morris, M., Davis, G., & Davis, F. (2003). User acceptance of information technology: toward a unified view. *MIS Quarterly*, *27*(3), 425–478.

Windschitl, M., & Sahl, K. (2002). Tracing teachers' use of technology in a laptop computer school: The interplay of teacher beliefs, social dynamics, and institutional culture. *American Educational Research Journal, 39*(1), 165–205.

Yang, S. C., & Huang, Y. F. (2008). A study of high school English teachers' behavior, concerns and beliefs in integrating information technology into English instruction. *Computers in Human Behavior*, *24*, 1085–1103.

Table 1

Descriptive Statistics and Normality Estimates

Variables	CPB	TPB	PU	PEU	ATCU	IU
M	4.498	2.334	4.167	3.327	4.039	4.238
SD	.784	.704	.506	.604	.458	.912
Skewness	-.261	.629	.139	-.088	.195	-.387
Kurtosis	.950	.615	.379	.867	.295	.827

Note. CPB: constructivist pedagogical beliefs; TPB: transmissive pedagogical beliefs; PU: perceived usefulness; PEU: perceived ease of use; ATCU: attitude toward ICT use; IU: intention to use

Table 2

Bivariate Correlations between Variables

Variables	PU	PEU	ATCU	IU	CPB	TPB
PU	1					
PEU	.158*	1				
ATCU	.534***	.319***	1			
IU	.378***	.259***	.442***	1		
CPB	.264**	.239**	.335***	.073	1	
TPB	.128	.294***	.088	.127	.009	1

Note. PU: perceived usefulness; PEU: perceived ease of use; ATCU: attitude toward ICT use;

IU: intention to use; CPB: constructivist pedagogical beliefs; TPB: transmissive pedagogical

beliefs.

* $p < 0.05$;   ** $p < 0.01$; *** $p < 0.001$

Table 3

Path Analysis Result with Parameter Estimates

Path	Path Coefficient	*SE*	*t*	*p* Value
H1 PEU←CPB	.236***	.068	3.48	.000
H2 PU←CPB	.263***	.069	3.81	.000
H3 ATCU←CPB	.163*	.063	2.54	.011
H4 PEU←TPB	.292***	.066	4.42	.000
H5 PU←TPB	.125	.072	1.74	.082
H6 ATCU←TPB	-.037	.064	-.57	.569
H7 ATCU←PEU	.220**	.065	3.35	.001
H8 ATCU←PU	.464***	.058	7.93	.000
H9 IU←ATCU	.381***	.044	8.66	.000

Note. CPB: constructivist pedagogical beliefs; TPB: transmissive pedagogical beliefs; PU: perceived usefulness; PEU: perceived ease of use; ATCU: attitude toward ICT use; IU: intention to use
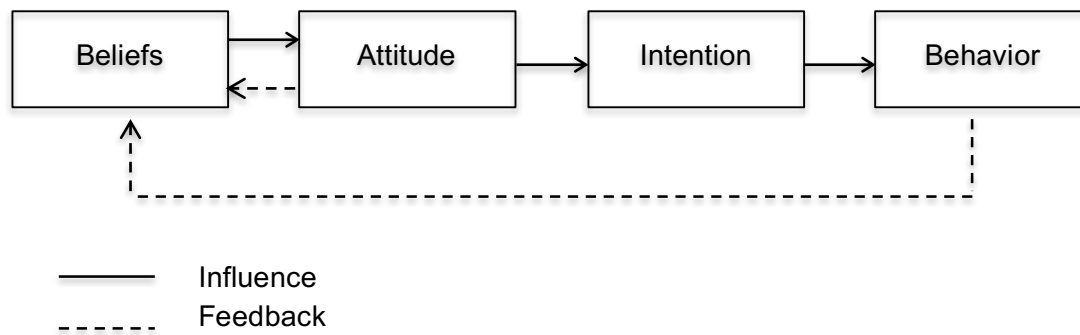
* *p* < .05; ** *p* < .01; *** *p* < .001

Figure 1. Conceptual framework relating beliefs, attitudes, intentions, and behaviors (Adapted

from Fishbein and Ajzen, 1975)
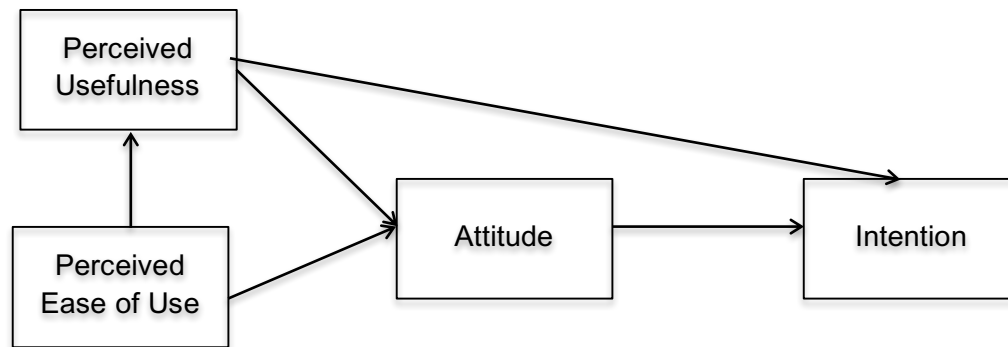
Figure 2. Technology acceptance model (Davis et al., 1989)
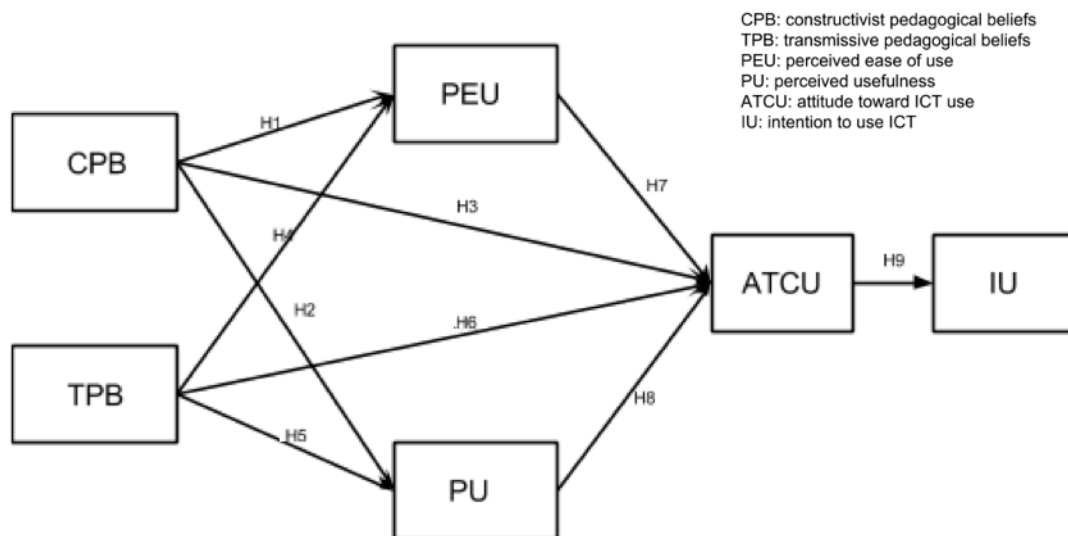
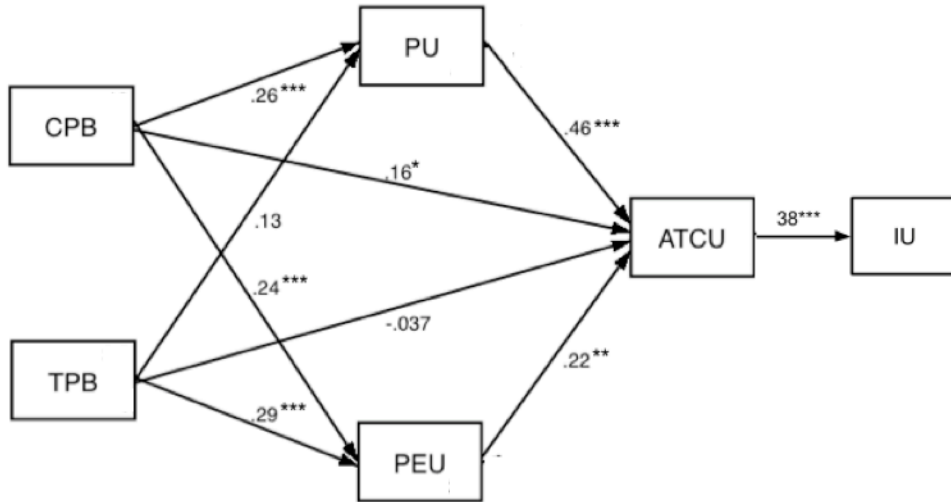*Figure 3*. Proposed research model

Figure 4. Path analysis of the proposed research model with standardized path coefficients

(Fit Indices: χ^2 (2) = 0.751, p = .386; RMSEA=0.000; CFI=1.000; SRMR=0.019)

Note. CPB: constructivist pedagogical beliefs; TPB: transmissive pedagogical beliefs; PU: perceived usefulness; PEU: perceived ease of use; ATCU: attitude toward ICT use; IU: intention to use ICT.

* $p< 0.05$; ** $p < 0.01$; *** $p < 0.001$

Appendix A. Measurement items in the questionnaire

Construct	Item No.	Items
Perceived usefulness (PU)	PU1	Using ICT will improve my work in language teaching.
	PU2	Using ICT will enhance my effectiveness in language teaching.
	PU3	Using ICT will increase my productivity in language teaching.
	PU4	I find ICT a useful tool in my classroom.
Perceived ease of use (PEU)	PEU1	My interaction with computers in language teaching is clear and understandable.
	PEU2	I find ICT easy to use in language teaching.
	PEU3	I find it is easy to learn how to use ICT in language teaching.
	PEU4	It would be easy for me to become skillful at using ICT to teach language.
Attitude toward ICT use (ATCU)	ACTU1	ICT make language teaching more interesting.
	ACTU2	Working with ICT in language teaching is fun.
	ACTU3	I like using ICT in language teaching.
	ACTU4	I look forward to using ICT in language teaching.
Intention to Use (IU)	IU1	I intend to continue to use ICT for language teaching in the future.
	IU2	I expect that I would use ICT for language teaching in the future.
	IU3	I plan to use ICT for language teaching in the future.
Constructivist	CPB1	Learning means students have ample opportunities to explore,

Pedagogical		discuss and express their ideas.
Beliefs (CPB)	CPB2	Every student is unique or special and deserves an education tailored to his or her particular needs.
	CPB3	It is important that a teacher understands the feelings of the students.
	CPB4	Good teachers always encourage students to think for answers themselves.
	CPB5	In good classrooms, there is a democratic and free atmosphere which stimulates students to think and interact.
Transmissive	TPB1	During the lesson, it is important to keep students confined to the textbooks and the desks.
Pedagogical		
Beliefs (TPB)	TPB2	Learning to teach simply means practicing the ideas from lecturers without questioning them.
	TPB3	Teaching is simply telling, presenting or explaining the subject matter.
	TPB4	Good teaching occurs when there is mostly teacher talk in the classroom.
	TPB5	Teaching is to provide students with accurate and complete knowledge rather than encourage them to discover it.