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REGULAR ARTICLE

The Predicting Role of EFL Students' Achievement Emotions and Technological Self-efficacy in Their Technology Acceptance

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Abstract Various studies have been done on shifting toward technology-based second language (L2) education. However, the influence of psycho-emotional factors on students' technology acceptance is overlooked. To fill this gap, the present quantitative study examined the role of students' achievement emotions and technological self-efficacy in predicting their technology acceptance in China. To this end, 380 Chinese students were invited to complete three questionnaires. The results of structural equation modeling revealed that Chinese L2 students' achievement emotions and technological self-efficacy are significant predictors of their technology acceptance; technological self-efficacy uniquely could explain 59% of its variance and students' achievement emotions could explain 75% of its variance. The study also draws some conclusions and offers implications for L2 teachers, students, and school managers to foster the acceptance of technology in L2 education.

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Introduction

The use of innovative technologies in teaching and learning a second/foreign language (L2) has considerably flourished in the past decades (Derakhshan & Fathi, 2023; Teo, 2011; Teo & Van Schaik, 2012; Teo et al., 2022). Given the limitations of traditional face-to-face and on-campus education as well as the abrupt shift toward online education during the COVID-19 pandemic, many academic centers have resorted to online delivery (Cai, 2021; Derakhshan et al., 2021; Pawlak et al., 2021). In such a mode of education, there are no time and space constraints and students can use innovative ways to communicate and present their courses (Stephan et al., 2019). However, the application of technologies to L2 education requires several considerations as they may leave cognitive and emotional impacts on students (Loderer et al., 2020). In comparison to traditional education, English as a second/foreign language (EFL/ESL) students may experience different emotions and affective states in technology-supported settings (Shao et al., 2023). They cannot use and benefit from technologies unless they accept them (Xu et al., 2020). Yet, low technological competency, emotional pressures, and the isolated learning nature have produced many challenges for students (Yu, 2021). Additionally, the way EFL students cognitively and emotionally appraise technologies determines their acceptance and takeaway in online learning (Ding & Zhao, 2020).

Based on the control value theory (CVT) of emotions, the features of online education and technology may affect EFL students' perceived control and value regarding achievement tasks and outcomes (Pekrun, 2006). Previous studies

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showed that EFL students' have experienced negative feelings such as boredom, anxiety, annoyance, and frustration as well as positive emotions like enjoyment, excitement, and self-regulated learning in technology-based environments (e.g., Derakhshan & Fathi, 2023; Derakhshan et al., 2021, 2022; Ding & Zhao, 2020; Liu & Darvin, 2023; Wang, 2023; Wang et al., 2022a, 2022b; Zhang & Lin, 2020). It is also asserted that students' achievement emotions influence their self-efficacy beliefs in online learning and technology use/acceptance (Ahmadipour, 2022; Alavi et al., 2021; Hilliard et al., 2020; Liu et al., 2023; Teo, 2011). Multifarious challenges related to technology place pressure on students, and this may have different manifestations in students. Some may respond to such emotional forces positively, while others may lose their motivation to learn (Limiansi & Hadi, 2022; Liu et al., 2023). In using technologies, students' self-efficacy concerns their ability to encounter challenges and try to solve them (Bandura, 1997). High self-efficacy has been found to generate confidence, academic success, and self-regulated online-learning strategies among students (Ahmadipour, 2022; Mellati et al., 2018; Su et al., 2018).

Although research on L2 students' perceived emotions and technological self-efficacy is growing, the current literature is still limited to their causes, solutions, and consequences for learning and the way they influence EFL students' technology acceptance is unaddressed. Technology acceptance is defined as a user's inclination to utilize technology to accomplish a task or assignment (Teo, 2011). It is affected by students' intentions, behaviors, attitudes, and perceived usefulness and easiness of technologies (Davis, 1989; Djamasbi et al., 2010). Operationally, technology acceptance in this research refers to EFL teachers' willingness to admit and use online-learning platforms and learning management systems (LMS). As put by Zheng and Li (2020), students' acceptance of technologies is shaped and directed by their inner forces. When they are sure of their abilities and experience positive emotions, they are more likely to accept, use, and benefit from technology-enhance education. However, the way EFL students' perceived achievement emotions and self-efficacy beliefs influence their technology acceptance, in online learning, is less attended by scholars. To fill this gap, this study examined the potential of such constructs in predicting Chinese EFL students' technology acceptance. By doing so, it offers insightful ideas to EFL teachers and educators considering the emotional side of online education.

Literature Review

Achievement Emotions and (Online) Learning

It is known that students' perceived achievement emotions play a critical role in their performance, learning, and the outcomes of an activity (Pekrun et al., 2017). Depending on their appraisals of task difficulty and degree of control, students may experience different positive and negative emotions upon completing achievement activities. Positive emotions are activating and may generate creative thinking and reflectivity, while negative emotions are deactivating and usually lower students' academic performance (Pekrun et al., 2011). Furthermore, research shows that positive emotions like hope, enjoyment, and hope are positively correlated with motivation, effort, commitment, and self-regulation, while negative emotions such as boredom, shame, anger, and anxiety lead to weak performance (Pekrun et al., 2011).

In the context of online education and technology-enhanced learning, students may face different chances and challenges, which, in turn, causes more achievement emotions in traditional learning (Lee & Chei, 2020). Given the complexity and newness of technology-based L2 education, students may experience negative emotions like boredom and frustration more frequently (Derakhshan et al., 2021; Wang, 2023). It has been contended that achievement emotions vastly influence online learning in that positive emotions produce conducive outcomes for online learning, whereas negative emotions damage it (Pan et al., 2022). The features of technology-enhanced learning such as flexibility, asynchrony, and multimodality make learners feel positive achievement emotions like joy, satisfaction, interest, and relief (Wu et al., 2021; Zembylas et al., 2008). However, learners with negative achievement emotions felt bored, disengaged, and unwilling to attend online classes (Derakhshan et al., 2023b; Pan et al., 2023; Tzafilkou et al., 2021). Despite complexities and the interactive effect of several factors in determining the outcome of achievement emotions in relation to technologies, research is growing in this area (Shao et al., 2023). Achievement emotions have been found context-dependent and domain specific (Loderer et al., 2020). However, the way they materialize in online English language education milieus is unclear in China. Moreover, their correlates, antecedents, and outcomes in technology-enriched L2 education are new lines of thinking.

Online Learning Self-efficacy

Self-efficacy, or one's beliefs in his/her competencies and capacities to organize and implement an act successfully in a particular situation, determines self-regulation processes (Bandura, 1997). It shapes students' effort, task selection, persistence, and achievement (Wang et al., 2013). Like other academic domains, being self-efficacious about technology is also paramount for EFL students. This claim is in line with Bandura's (1997) conceptualizations of self-efficacy, too. According to the social cognitive theory (SCT), self-efficacy beliefs are domain-specific perceptions of one's capabilities to complete a task successfully. It has three parameters of

magnitude, strength, and generality. Based on this conception, self-efficacy works with collective agency and other socio-cognitive factors to regulate one's actions, well-being, and achievement. This construct is very significant in education, especially during challenging transitions in modes of delivery. It is believed that this form of self-judgment influences students' thought processes, the degree and constancy of motivation, and emotional states (Bandura, 1997).

Consequently, concerning technologies, students should make sure of their skills to use emails, e-learning platforms, discussion boards, weblogs, and Internet engines (Alfadda & Mahdi, 2021). There is a close connection between technology self-efficacy and students' academic performance and success in online settings (Chen, 2014). Depending on the degree of efficacy, students may experience different emotional states in light of technology. Those who are technophobes and afraid of computers may experience anxiety, frustration, confusion, a loss of personal control, and isolation (Pekrun et al., 2011; Wang et al., 2023). In contrast, students with high technology or online self-efficacy beliefs show more self-regulated learning strategies, motivation, confidence, engagement, and satisfaction (Han et al., 2021; Limiansi & Hadi, 2022; Su et al., 2018). All such purported benefits of technology for EFL learners hinge upon their acceptance of technology, as the first step explained below.

Technology Acceptance

The concept of technology acceptance is a term taken from a popular model known as the technology acceptance model (TAM) (Davis, 1989). It refers to a user's willingness to use technology as a support to accomplish a given task (Teo, 2011). The term is used to explain the factors that determine the acceptance of technologies and users' behaviors (Sukendro et al., 2020). The degree of technology acceptance is claimed to be shaped by two factors, namely 'perceived usefulness' and 'ease of use,' which consequently influence one's usage behavior (Teo & van Schaik, 2012). Other than these, social factors, subjective norms, cognitive structures, and experience affect technology acceptance, too (Venkatesh et al., 2003). As posited in TAM, students' intention can determine their actual technology use (Fig. 1).

According to this model, one's intention to use technology is directly influenced by his/her perceived usefulness of that form of technology (benefit of use) and its ease and manageability (simple usage). The more the perceived usefulness and ease of use, the higher the acceptance rate. It is shown that intention stability, behavior specificity, perceived risk of use, and trust impact the interaction among the elements of TAM (Schnall et al., 2015). Additionally, learners' psycho-affective factors such as anxiety, attitude, self-regulated learning, and self-efficacy may interact with technology acceptance or rejection (Lai, 2013). However,

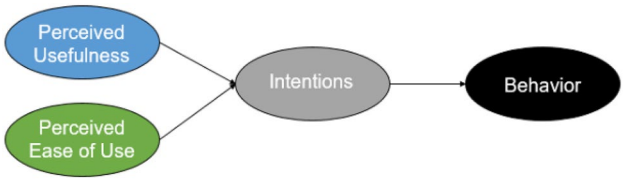

Fig. 1 Elements and mechanism of TAM (Davis, 1989)

researching these issues, especially in L2 education, is in its inception and much room is left open for scientific work.

Related Studies

The use of technology in L2 education and its acceptance have been studied considerably in the past couple of decades (Joo et al., 2018; Nikou & Economides, 2017). Several studies have explored students' behaviors and (un)willingness to use different forms of technology in their classes (e.g., Deng & Peng, 2021; Shen et al., 2022; Teo, 2011; Wang & Derakhshan, 2023). Furthermore, it has been argued that shifting toward technology-enhanced education may produce different emotional reactions in students (Wang et al., 2022a, 2022b). Given the nature of technologies, students experience achievement emotions that may differ from face-to-face instruction (Lee & Chei, 2020). Research shows that experiencing positive emotions like joy, happiness, engagement, and satisfaction in online-learning environments increases academic success and technology acceptance among learners (Pan et al., 2022). On the other hand, negative achievement emotions in using technology hamper students' academic outcomes and efforts (Pan et al., 2023; Tzafilkou et al., 2021). In an experimental study, Stephan et al. (2019) examined the achievement emotions of 182 students and their impact on technology acceptance. The results revealed that students experienced different levels of achievement emotions (positive and negative) in both online and on-campus contexts. Recently, some efforts have been made to unpack factors that influence EFL students' achievement emotions in online-learning contexts (e.g., Shao et al., 2023). However, they are limited to the COVID-19 pandemic era. The application of CVT to technology-enhanced learning environments has also been vastly examined (Bieg et al., 2017). Quite recently, Derakhshan and Fathi (2023) investigated the interrelationship among foreign language enjoyment (FLE), L2 grit, online-learning self-efficacy (OLSE), and online-learning engagement among EFL learners. Their findings revealed that FLE positively could influence online-learning engagement and OLSE positively could impact online-learning engagement. Furthermore, it was found that online self-efficacy could mediate the relationship between L2 grit and online-learning engagement.

Moreover, a growing area of research has focused on the impact of students' psycho-emotional constructs (anxiety, efficacy, self-regulation) on their technology acceptance and technological self-efficacy (Lai, 2013; Liaw & Huang, 2013). Previous studies also indicated a positive correlation between learners' technological self-efficacy and technology acceptance and use (Celik & Yesilyurt, 2013). This connection has proven technological self-efficacy as one of the determinants of students' control beliefs regarding technology use (Mew & Honey, 2010). In a correlational study in China, Su et al. (2018) found technological and online self-efficacy a critical factor in shaping EFL learners' self-regulation. Despite these studies, the current literature is mainly directed at the factors influencing students' achievement emotions, self-efficacy, and technology acceptance. Nevertheless, their interplay in L2 education is a new line for research. Additionally, it is not clear how strong their relationship and predicting power are in EFL contexts. To date, the importance of each of these constructs in online L2 education has been approved, but the possible bond among them and whether achievement emotions and technological self-efficacy predict Chinese EFL students' technology acceptance have remained under-researched. To fill this gap, this study collected survey data from a sample of Chinese EFL students to determine the predicting power of achievement emotions and technological (online) self-efficacy in their technology acceptance. It tried to answer the following research question:

RQ: How much variance in Chinese EFL students' technology acceptance can be predicted by their technological self-efficacy and achievement emotions?

Method

Participants

The survey involved 450 students who majored in foreign languages and applied linguistics, English languages, and literature, business English, tourism English, or translation. Of the sample, 380 students were considered valid based on their responses. They came from different places in China including Jiangsu (142), Zhejiang (110), and Anhui (128) provinces. In our present survey, 20.22% of them were male students, and 79.78% of them were female. According to their English proficiency, the participants whose ages vary from 19 to 22 were categorized into four types. The largest proportion of which was intermediate, taking up approximately 37.56%, the second and third largest proportion of which was upper-intermediate and elementary, occupying, respectively, 23.56% and 22.89%, and the smallest proportion of which was advanced learners, amounting to 16%. In terms of the participants' educational qualifications, 82.22% of the participants in this survey were undergraduate students, followed by 15.11% of MA students, in addition to 2.67% of PhD candidates. To ensure a certain degree of privacy for the participants, the researchers informed all respondents that the results would be used for research purposes only.

Instruments

Achievement Emotions Questionnaire

The short version of Pekrun et al.'s (2011) scale was used in this study. It included 96 items that measured different emotions perceived by EFL students related to classroom, learning, and test. The scale used a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). It had three main categories that were class-related emotions, learning-related emotions, and test-related emotions. These three main categories had eight subcategories: enjoyment, hope, pride, anger, anxiety, shame, hopelessness, and boredom. Every subcategory was determined through four items. To make it understandable, the researchers computed the items of every subcategory into one item; therefore, the final version of the questionnaire had 24 items. The overall reliability of the scale was assessed again, and the results of Cronbach's α showed a satisfactory index of .91 ($r = .91$).

Technological Self-efficacy Questionnaire

To evaluate this variable, we employed Miltiadou and Yu's (2000) questionnaire which encompassed 29 items. It is a 4-point scale spanning from 1 (not confident at all) to 4 (very confident). The items were divided into two categories of general technology self-efficacy (17 items) and online-learning platform technology self-efficacy (12 items). The reliability of the sub-scales was measured by Cronbach's α, which was observed to be .94 and .96, respectively.

Technology Acceptance Questionnaire

As the third tool, a short version of technology acceptance questionnaires proposed by Davis et al. (1989) and Venkatesh et al. (2003) was employed. It included 12 items and four subcategories: perceived usefulness, perceived ease of use, attitude towards usage, and behavioral intention (each containing three items). The respondents had to choose an option from 1 (totally disagree) to 5 (totally agree). Concerning its reliability, the questionnaire had an overall reliability of .91 as estimated by Cronbach's α. Concerning its four sub-scales, they were found to have a reliability of .72, .83, .77, and .73, respectively.

Data Collection Procedure

The data of this study were collected from three online questionnaires related to EFL students' achievement emotions, technological self-efficacy, and technology acceptance from a sample of 350 Chinese EFL learners. The participants belonged to different genders, age ranges, and academic degrees from the three provinces of Jiangsu, Zhejiang, and Anhui. Before starting the data collection, the goal of the study and the definition of the constructs were explained to the respondents in a Word file alongside the questionnaires' links. After ensuring the privacy and confidentiality of information and answers, the researchers asked the participants to answer each item carefully and submit the full booklet. After 3 weeks, 450 questionnaires were collected of which roughly 380 were valid. Those that were submitted in a very short time (less than 3 min), and contained missing data and errors were regarded as invalid and excluded. When the data collection phase terminated, the researchers closed the online link and once more examined the whole data carefully to identify possible mistakes before analyses. Afterward, the data were statistically analyzed through SPSS software, and suitable statistical methods were run according to the research question.

Data Analysis

To analyze the data, the researchers first ran data screening to locate and remove possible unengaged responses from the dataset. Then structural equation modeling (SEM), confirmatory factor analysis, and regression analysis were used to extract a model of relationships among the three constructs of achievement emotions, technological self-efficacy, and technology acceptance. Moreover, to verify the hypothesized model of interaction among the variables, we carefully estimated different goodness-of-fit indices. The final results were then illustrated via different statistical Tables and Figures.

Results

Data Screening

Before going through the analysis of the collected data, they were examined to make sure they are no unengaged responses. First, the existing patterns were checked out and 48 cases that showed odd patterns (i.e., constant, increasing, or decreasing) were excluded. Then, the standard deviation of each respondent's answers to all three questionnaires was calculated. To have acceptable variability, we excluded the cases with standard deviations below 0.5 as they could be considered unengaged respondents. This left the final gleaned data with 380 cases.

Construct Validity

Our data included three constructs with items in the second and third order. Using confirmatory factor analysis, we made sure that the used instruments validly measure the constructs in hand. To do so, we created a CFA model using IBM AMOS (version 24). The initial step was to check out the standardized loadings for each item and component. We took a cut-off point of 0.45 as our criteria following Kline's (2016) recommendation. According to him, items that have loadings lower than 0.45 endanger the convergent validity. None of the items had loadings below the cut-off point. However, within achievement emotion, some sub-components, i.e., enjoyment and pride under all three main components of class-related emotions, learning-related emotions, and test-related emotions, as well as the sub-components of hope and anger under test-related emotions, showed problematic value. These sub-components were causing serious problems for model fit. Therefore, we decided to remove them from the model. We also took into account the modifications suggested by the software to improve the model fit.

After applying the modifications, the model reached acceptable to excellent goodness indices. Four indices suggested by Kline (2016) were checked out. These indices are minimum discrepancy function by the degree of freedom (CMIN/df), root-mean-square error of approximation (RMSEA), comparative fit index (CFI), Tucker–Lewis index (TLI), parsimonious normed fit index (PNFI), and standardized root-mean-square residual (SRMR). The observed values in the model were CMIN/df = 2.066; RMSEA = 0.053; CFI = 0.915; TLI = 0.906; and PNFI = 0.740. According to Hu and Bentler (1999), the acceptable values for CMIN/df are between 1 and 3; RMESA below 0.08; CFA and TLI above 0.9; and PNFI above 0.5. Therefore, all observed indices suggested that the model enjoys goodness of fit.

The discriminant validity of the model was also checked out through Fornell–Larcker criterion. According to Fornell and Larcker (1981), for having a divergent (discriminant) validity, the square root of the average variance explained (AVE) by each component must be above the correlation of that component with other ones. Table 1 shows the obtained results.

The bold values in Table 1 are the square roots of AVE for each component. As reported technology acceptance and technological self-efficacy had a strong correlation ($r = 0.609$), the correlations between achievement emotions and technology acceptance ($r = 0.067$) as well as achievement emotions and technological self-efficacy ($r = 0.078$) were small. All correlation coefficients were lower than the

Table 1 Convergent and discriminant validity

	CR	AVE	MSV	Fornell–Larcker		
				Technological self-efficacy	Technology acceptance	Achievement emotions
Technological self-efficacy	0.896	0.812	0.371	**0.901**		
Technology acceptance	0.949	0.824	0.371	0.609	**0.908**	
Achievement emotions	0.933	0.823	0.006	0.078	0.067	**0.907**

square root of AVE for each component, acknowledging the discriminant validity. Moreover, the composite reliability (CR) for each component was safely above the cut-off value of 0.7 and the maximum shared variance (MSV) for each component was lower than the estimated AVE for that component. These latter two conditions further acknowledge the convergent validity of the model.

As reported in Table 2, all distributions of scores showed normalcy as both skewness and kurtosis values were below the absolute value of 2. Using the imputed values, a measurement model was created to answer the research question of the study.

Structural Model

Having made sure of the convergent and discriminant validity of the CFA model, we used a regression imputation to impute the total value for the components in the model. The imputation was chosen instead of mere calculation of the total values as it takes into account the share of each item based on the standardized loadings. Table 2, above, presents the descriptive statistics of the results.

In order to explore the predictability of technology acceptance by technology self-efficacy and academic emotions, we ran a structural equation modeling (SEM). Figure 2 shows the measurement model. Before conducting SEM analysis, the researchers checked the assumptions of this analysis. The results showed that the data met the assumptions of the SEM, and there were no violations of the assumptions of multivariate normality, no systematic missing data, a sufficiently large sample size, and correct model specification.

Finally, the results of the SEM analysis are presented in Table 3. As reported the two predicting variables, i.e., students' technological self-efficacy and achievement emotions were significant predictors of their technology acceptance. It means that students' technological self-efficacy uniquely explains 59% of changes in their technology acceptance ($\beta = .59$, $p = .000 < .01$), and students' achievement emotions uniquely explain 75% of changes in their technology acceptance ($\beta = .75$, $p = .000 < .01$) (Fig. 3).

In Table 3, the result indicated that five determiners are the ratio of CMIN-DF, goodness-of-fit index (GFI), comparative fit index (CFI), Parsimonious Normed Fit Index (PNFI), Tucker–Lewis Index (TLI), and root-mean-square error of approximation (RMSEA). The model fit indices are all within specifications. Therefore, CMIN/DF is 2.066 (spec. ≤ 3.0), GFI = 0.915 (spec. > 0.9), CFI = .915 (spec. > 0.9), PNFI = 0.901 (spec. > 0.5), TLI = 0.906 (spec. > 0.9), and RMSEA = 0.053 (spec. < 0.080).

The results of Table 4 represent that achievement emotions predict students' technology acceptance. The values indicate that about 76% of changes in students' technology acceptance can be predicted by their achievement emotions; about 59% of changes in students' technology acceptance can be predicted by their technological self-efficacy; about 70% of changes in students' technological self-efficacy can be predicted by their achievement emotions.

Discussion

This quantitative study aimed to examine the predicting role of Chinese EFL students' achievement emotions and technological self-efficacy in their technology acceptance. The results of SEM analysis revealed that the participants' achievement emotions and technological self-efficacy were significant predictors of their technology acceptance. In other words, students' technological self-efficacy could act as a significant predictor of their technology acceptance by uniquely explaining 59% of its variance, and students' achievement emotions could act as a significant predictor of their technology acceptance by uniquely explaining 75% of its variance. The obtained results agree with previous studies (e.g., Joo et al., 2018; Lee & Chei, 2020; Liaw & Huang, 2013), which certified the impact of emotions in using and accepting online education and technology. Regarding technological self-efficacy as the better predictor of technology acceptance, this study is in line with Celik and Yesilyurt (2013) and Mew and Honey (2010), who found EFL students' technological self-efficacy as a critical determinant of their technology acceptance. This also partly reflects Banduar's (1997) self-efficacy theory that underscores one's self-assurance in doing an activity as the first step in accomplishing it. Therefore, the obtained results can be ascribed to Chinese EFL students'

Table 2 Descriptive statistics of the scores after regression imputation

	Minimum	Maximum	Mean	SD	Skewness	Kurtosis
Emotions						
Classroom-related emotions (CRE)						
Boredom	1.03	5.13	3.5244	.89364	− .165	− .366
Hopelessness	1.02	5.11	3.7379	.87580	− .465	− .046
Shame	.94	4.68	3.1591	.79194	− .095	− .311
Anxiety	.96	4.78	3.1584	.78321	− .068	− .214
Anger	.92	4.57	3.2208	.79827	− .444	− .090
Hope	.90	4.52	3.1664	.77392	− .351	.224
Pride	.94	4.68	3.1591	.79194	− .095	− .311
Enjoyment	.92	4.57	3.2208	.79194	− .095	− .311
CRE	.40	1.98	1.3710	.29701	− .127	− .144
Learning-related emotions (LRE)						
Boredom	.98	4.88	3.3118	.85114	− .016	− .520
Hopelessness	1.02	5.05	3.4435	.86009	− .040	− .453
Shame	1.02	5.07	3.4325	.83477	.032	− .354
Anxiety	1.00	4.97	3.2375	.88812	.210	− .534
Anger	1.00	4.97	3.4444	.85093	− .130	− .410
Hope	.93	4.64	3.3187	.73957	− .384	.319
Pride	1.02	5.05	3.4435	.86009	− .040	− .453
Enjoyment	1.02	5.07	3.4325	.83477	.032	− .354
LRE	.39	1.92	1.3025	.30308	.061	− .317
Test-related emotions (TRE)						
Boredom	.95	4.74	3.2977	.84461	− .211	− .399
Hopelessness	1.01	5.04	3.4167	.85478	− .035	− .479
Shame	.96	4.78	2.9822	.85302	.184	− .464
Anxiety	.91	4.53	3.1585	.76996	− .218	− .284
Anger	.92	4.57	3.2208	.79827	− .444	− .090
Hope	.90	4.52	3.1664	.77392	− .351	.224
Pride	.94	4.68	3.1591	.79194	− .095	− .311
Enjoyment	.92	4.57	3.2208	.79194	− .095	− .311
TRE	.76	3.79	2.5763	.61226	− .041	− .347
Total	.34	1.67	1.1374	.25529	.053	− .270
Technology self-efficacy (TSE)						
Online planform	1.17	4.04	2.7457	.61306	.421	− .125
General	1.14	3.76	2.6260	.59539	.355	− .485
TSE	1.35	3.71	2.5844	.54216	.407	− .411
Technology acceptance (TA)						
Behavioral intention	.95	4.62	3.4587	.72573	− .515	.599
Attitudes	1.01	4.91	3.6055	.75569	− .299	.403
Usefulness	1.00	4.79	3.5352	.71152	− .321	.543
Ease of use	1.02	5.02	3.7342	.80843	− .550	.567
TA	1.04	4.83	3.5625	.69927	− .333	.601

understanding of psycho-emotional factors involved in technology-enhanced L2 contexts. They agreed that their assurance of their own technological capabilities fosters their acceptance of technology in their L2 education. This is warranted because self-efficacy determines one's emotional control and self-regulation strategies (Su et al., 2018).

In addition, the ability of achievement emotions to predict EFL students' technology acceptance, in this study, is in agreement with Pekrun's (2006) CVT, which argues that students' appraisals and outcomes of achievement activities influence their emotions and behaviors. To put it simply, students' perceived emotions when doing IT-based activities shape their acceptance of online learning. Additionally,

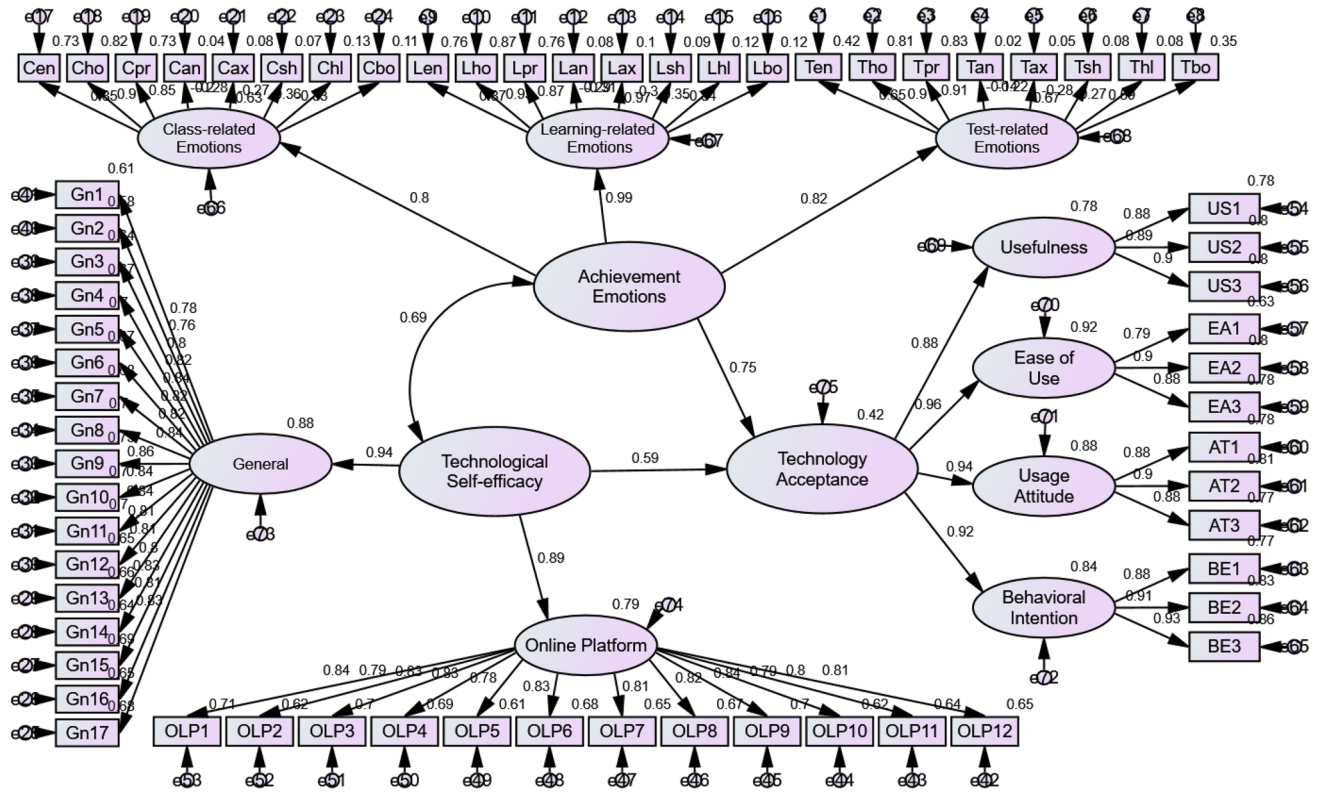

Fig. 2 The final structural model

Table 3 The goodness-of-fit estimation

Criteria		Threshold			Evaluation
		Terrible	Acceptable	Excellent	
CMIN	4138.198				
DF	2003				
CMIN/DF	2.066	> 5	> 3	> 1	Acceptable
RMSEA	.053	> 0.08	< 0.08	< 0.06	Acceptable
GFI	.915	> 0.8	> 0.9	> 0.95	Acceptable
CFI	.916	> 0.8	> 0.9	> 0.95	Acceptable
PNFI	.740		> 0.5		Acceptable
TLI	.906	> 0.8	> 0.9	> 0.95	Acceptable

the result is consistent with Ahmadipour (2022) and Hilliard et al. (2020), who pinpointed that students' achievement emotions directly and strongly affect their technology acceptance. An explanation for the finding can be Chinese EFL students' sufficient skills and a positive mentality to use technologies in their L2 education that augmented their emotional reactions. For the participants, technology acceptance seems to be associated with self-assurance and emotions experienced in using digital tools. The results can also be attributed to Chinese EFL students' attempts to be self-dependent and self-regulated in their L2 learning (An et al., 2020). This inclination may have guided them to see technological self-efficacy as more important and determinant when it comes to accepting/rejecting technologies. Overall, it can be asserted that EFL students' technology acceptance is affected by several personal, emotional, social, and contextual factors as well as infrastructures. Hence, it is not clear whether self-efficacy beliefs concerning technology have made all the contributions to technology acceptance or whether other factors played a role. This is left to future researchers.

Conclusion and Implications

This study investigated the role of Chinese EFL students' achievement emotions and technological self-efficacy in predicting their technology acceptance. Based on the findings, it could be contended that the acceptance of technology in EFL contexts depends on several factors including perceived technological self-efficacy. When EFL students have a high degree of self-efficacy in online contexts, they show more zest and engagement in accepting and using technologies. Once the requirements of technology-enhanced education are fulfilled in EFL classes and students are sure of their abilities to face and handle online instruction, they are more

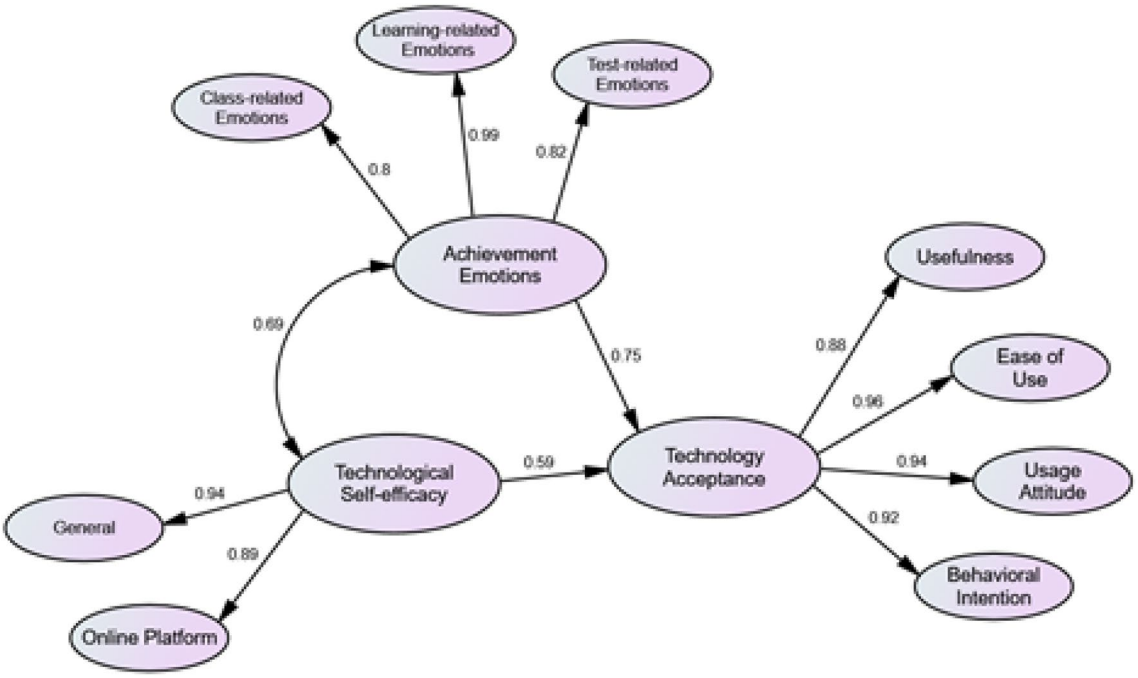

Fig. 3 The measurement models

Table 4 Results of multiple linear regression analysis with SEM

			Weight	S.E.	C.R.	*P*	*β*
Technology acceptance	<---	Achievement emotions	.757	.018	4.806	.000	.75
Technology acceptance	<---	Technological self-efficacy	.590	.066	8.818	.000	.59
Technological self-efficacy	<-->	Achievement emotions	.691	.008	1.389	.000	.70

likely to accept technologies for their language learning. Studies, such as this study, may enhance EFL students' and teachers' awareness of the psycho-affective side of technology integration into L2 learning. EFL students may understand and work on their self-efficacy beliefs and emotions to welcome technologies for their academic progress. EFL teachers can use the findings and design specific techniques and strategies that foster students' online self-efficacy. They may inject some forms of technology into their instruction (e-portfolio, weblog) as initial steps to make students eager to accept IT-based language learning. School managers may also use the findings and provide facilities and motivators for EFL students to welcome the integration of technology into their instruction.

Despite these implications, this study suffers its own limitations, too. The data were collected from only one context constraining the generalizability scope. Moreover, a pure quantitative design was employed in this study, while mixed-methods and qualitative studies could have provided deeper insights. Additionally, background factors were not considered in the interplay of the three variables, while gender, age, education, etc. may affect EFL students' acceptance of technology. To bridge the gaps, future researchers can use different research instruments (interviews, observation, diaries, and reflections) to determine how achievement emotions, technological self-efficacy, and technology acceptance correlate (Derakhshan et al., 2023a). Likewise, the integration of teachers' perspectives into those of students can be examined in the future, too. Finally, future research can be done on the impact of culture and other psycho-emotional factors (see Xie & Derakhshan, 2021) on EFL students' technology acceptance.

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Data Availability The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Competing Interests The authors declare that they have no competing interests.

Consent to Participate Informed consent to participate was obtained from all individual participants included in the study.

Consent for Publication Informed consent for publication was obtained from all individual participants included in the study.

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