Measuring EFL Learners' Perceptions of Technology Self-efficacy in Online Language Learning

Do Thi Thuy Linh[1*], Pham Ngoc Thach[2], Ngo Phuong Anh[3]

[1] Department of Foreign Languages, Haiphong University, Hai Phong, Vietnam
[2] Board of Trustees, Hanoi University, Ha Noi, Vietnam
[3] Hanoi University of Science and Technology, Ha Noi, Vietnam
[*]Corresponding author's email: linhdtt84@dhhp.edu.vn
[*] https://orcid.org/0000-0002-9714-5497
[*] https://doi.org/10.54855/ijli.24334

Received: 30/06/2024 Revision: 29/08/2024 Accepted: 02/09/2024 Online: 03/09/2024

ABSTRACT

Technology self-efficacy plays a pivotal role in learners' technology uptake during their learning process in technology-mediated learning environments. This study aims to explore EFL learners' perceived technology self-efficacy in online language learning. The quantitative data obtained in this study was via a survey questionnaire with 910 learners of a Vietnamese university. The study results revealed that the overall level of EFL learners' technology self-efficacy was moderate, except for their high efficacy in using the Internet to gather information. Moreover, these results indicated that male learners were more confident in fulfilling online learning tasks than their female counterparts. The learners majoring in engineering showed more confidence in their capability to use computers and learning management systems in their English learning process compared to those of other majors. However, the learners' length of time learning English had no significant impact on their perceptions of technology self-efficacy. The findings provide some insights into how the EFL learners perceive their self-efficacious beliefs of technology use in online language learning, which will help train strategies to promote technology uptake in Vietnamese higher education settings.

Keywords: technology self-efficacy, online learning, EFL learners, perception, measuring

Introduction

Since its debut in the early 1960s, technology has been recognized as an ultimate element of the education setting (Plumm, 2008). Many scholars (Goodman, 2001; Lai & Gu, 2011; Reinders & White, 2011) suggest that integrating technology in education can expand learners' resources, venues, and learning spaces and enable a self-initiated learning experience. Thanks to the Industrial Revolution 4.0, technology has helped to improve the efficiency of foreign language teaching and learning (Nguyen & Pham, 2022), particularly

CITATION | Do. T. T. L., Pham, N. T., & Ngo, P. A. (2024). Measuring EFL Learners' Perceptions of Technology Self-efficacy in Online Language Learning. *International Journal of Language Instruction, 3(3), 54-78.* DOI: https://doi.org/10.54855/ijli.24334

after the Covid-19 pandemic with the upsurge of technology-enhanced learning environments (Madden et al., 2023). In such a learning mode, technology self-efficacy (TSE) is seen as a crucial factor affecting learners' technology use for their learning (Qashou, 2021; River, 2021; Teo & van Schaik, 2012). As self-efficacy influences people's task choice, effort, and persistence (Schunk & Pajares, 2002), those having stronger self-efficacious beliefs are more likely to choose challenging activities, strive harder as well as stick to their selection even if they confront difficulties. Therefore, researchers also report that there is a positive correlation between learners' TSE and their perceived ease of technology use (Venkatesh & Davis, 1996), technology uptake (Eastin & LaRose, 2000), learner engagement (Chen, 2017), and learning performance especially in technology-mediated learning environments (Joo et al., 2000; Wang et al., 2013; Wei & Chou, 2020).

On the other hand, learners having lower TSE tend to suffer higher levels of anxiety (Compeau & Higgins, 1995; Shu et al., 2011; Wilfong, 2006), confusion, a loss of control, frustration, and withdrawal related to technology use in their learning (Bates & Khasawneh, 2004). Moreover, Gist and Mitchell (1992), together with Isman and Celikli (2009), pointed out that learners' inexperience with technology before entering university directly influences their level of TSE. Hence, efforts to enhance TSE may mitigate frustrating interactions with technology.

Given its essential role in online learning, although TSE has been well-researched in other contexts, it is under-researched in Vietnam. Recent work by Vietnamese researchers has explored TSE in different aspects, including computer self-efficacy (Ho et al., 2020), online tool management (Luu & Pham, 2022), and Internet self-efficacy (Pham et al., 2021). Yet, there needs to be empirical evidence in learners' perceptions of their TSE level regarding the use of computers, the Internet, and a learning management system in online language learning. Thus, this study was undertaken to bridge the gap. The primary aim of the study was to measure EFL learners' perceived level of TSE in online learning at tertiary education and to examine the associations between TSE and variables such as gender, major, and length of time learning English.

Literature Review

Definition of technology self-efficacy

In light of social cognitive theory, Wood and Bandura (1989) defined self-efficacy as "the belief in one's capabilities to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands" (p. 408). In other words, self-efficacy can refer to one's confidence in their capability to control their thoughts, affect, and actions needed for particular outcome attainment (Bandura, 2001; Christensen & Knezek, 2015). In the realm of education, self-efficacy is believed to be highly related to task choice, effort, persistence, and achievement (Multon et al., 1991; Schunk & Pajares, 2002) as well as adaptableness to new technology (Gist & Mitchel, 1992).

Grounded in self-efficacy theory, TSE is described by McDonald and Siegall (1992) as "the belief in one's ability to successfully perform a technologically sophisticated new task" (p.

467). Similarly, Cai et al. (2019), together with Saville and Foster (2021), conceptualized TSE as the level of confidence people have in successfully employing specific technologies to increase learning outcomes. These perspectives reach a consensus on viewing TSE as learners' perceived level of confidence in using technological learning tools to achieve targeted learning outcomes, which lays the theoretical base for this study.

TSE in online language learning

In online language education, TSE is believed to impact learners' interactions with digital platforms and resources and their learning experiences. Higher TSE enables learners to navigate online tools with greater ease, engage more proactively with content interactions, and collaborate more effectively with peers, thereby deepening their language learning experiences (Lai, 2008; Shakarami et al., 2013). As online education increasingly relies on technological gadgets for instruction and communication, learners' confidence in their technological skills is crucial for fully leveraging these resources (Pan, 2020).

Empirical evidence further supports the significance of TSE in technology-mediated language learning environments. Shakarami et al. (2013) found that learners with higher self-efficacious beliefs attained positive learning results in language tests compared to their peers with lower ones. Their study also highlighted that high self-efficacy facilitated individual learning and group interactions on online networking sites. Similarly, Pan (2020) emphasized that learners' perceived TSE and acceptance of technology radically influenced their learning outcomes. Furthermore, Wang et al. (2013) demonstrated that TSE is positively related to final online course results. These findings underline the need for educators to take TSE into consideration when designing online language learning to better support learner engagement and performance.

Different researchers perceived TSE differently in the context of higher education in Vietnam. Doan's (2021) research addressed TSE as levels of confidence in using technology for online learning. Other recent work by Vietnamese researchers has explored TSE in various aspects, such as computer self-efficacy (Ho et al., 2020), online tool management (Luu & Pham, 2022), and Internet self-efficacy (Pham et al., 2021). These previous studies shared a common finding that TSE was positively correlated with learners' learning experiences in online language environments.

Components of TSE in online learning

In the context of technology-enhanced learning, there are some specific self-efficacies, including computer, the Internet, and learning management use, which can be regarded as subscales under the umbrella concept of TSE (Al-Harthi, 2016; Alqurashi, 2016; Chien, 2012; Sun et al., 2008).

Computer self-efficacy (CSE) is referred to as "an individual's perceptions of his or her ability to use computers in the accomplishment of a task" (Compeau & Higgins, 1995). It can be featured at both generic and application-specific levels (Marakas et. al, 1998), which encompasses not only general information, communication literacy, and digital literacy (Kennedy et al., 2008) but also discipline-specific competencies (Clark et al., 2009) as well as computer application selection for learning (Ertmer et al., 2010; Lai et al., 2012). CSE

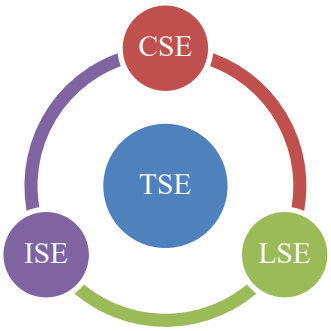
impacts perceived ease of use (Terzis & Economides, 2011) and ultimately affects learners' willingness and intention to use the computer (Chang & Tung, 2008; Hsu et al., 2009).

When expanded to the World Wide Web domain, Internet self-efficacy (ISE) is taken into consideration. It is conceptualized as "the belief in one's capabilities to organize and execute courses of Internet actions required to produce given attainments" (Eastin & LaRose, 2000, p. 1). On the same line, Tsai and Tsai (2003) and Lai (2008) viewed ISE as people's confidence or perception of their capability to use the Internet. Some researchers (e.g., Darnell & Hagg, 2002; Miltiadou & Yu, 2000; Whitty & McLaughlin, 2007) argued that ISE could be differentiated from CSE by looking at the advancement of the Internet or online technology and dissimilarities in the skill sets acquired for a computer or Internet-based technologies use. Some of the skills, for instance, connecting to the Internet or starting a web browser, can be categorized as simple, while the others involving managing a blog or publishing a website can be seen as sophisticated.

The third construct of TSE is learning management system self-efficacy (LSE), which is defined as "learners' self-assessment regarding one's skills using a learning management system (LMS)" (Martin et al., 2010, p.30) or the extent to which one can have confidence in their capabilities in using learning management system (Zheng et al., 2018). Jia et al. (2014) research results reveal that this type of self-efficacy positively affects the task outcome. In their studies, Martin et al. (2010) developed and validated a measurement scale investigating learners' confidence levels with learning management system use, including course content and test access, grade views, asynchronous and synchronous communication, and the use of advanced tools. Their findings show that there was a positive relationship between learners' LSE and their course performance in the hybrid learning environment.

Figure 1

The components of TSE in online learning



* TSE: technology self-efficacy, CSE: computer self-efficacy, ISE: Internet self-efficacy, LSE: learning management system self-efficacy

Measuring tools for TSE

Developing a measuring tool for TSE is important because it allows the opportunity to gauge learners' beliefs accurately and determine their capabilities to employ technology effectively. Various measurement instruments using different scales and surveys have been introduced in this regard. Compeau and Higgins (1995) created a Likert-scaled survey with 21 items

assessing people's CSE. They asked the respondents to rate their level of confidence in technology use. The higher score signifies a higher level of self-efficacy. After being reviewed, this scale ensures both content and construct validity as well as reliability (Wang et al., 2004).

Having been influenced from their work, many measures of TSE have been adopted in numerous ways, such as online TSE (Miltiadou & Yu, 2000), online learning self-efficacy (Zimmerman & Kulikowich, 2016), information technology self-efficacy (Hwang et al., 2016), ISE (Easten & LaRose, 2000; Jokisch et al., 2020) and learning management system self-efficacy (Martin et al., 2010). This study conceptualizes TSE as a construct with three sub-dimensions involving CSE, ISE and LSE (see Figure 1). Consequently, the previous measurement instruments lay the basis for designing a data collection instrument for this research.

Research Questions

This study sought to answer these two research questions:

1. How do the EFL learners perceive their technology self-efficacy in an online language learning environment at a Vietnamese university?
2. Are there any differences in EFL learners' perceived technology self-efficacy with reference to gender, major, and length of time learning English?

Methods

The quantitative method was employed in this study because of its strengths in "conceptualizing variables, profiling dimensions, tracing trends and relationship, formalizing comparisons and using large and perhaps representative sample" (Punch, 2013, p. 304).

Participants

The population of this study was first-year non-English majors of the research site who were enrolling in the General English 1 course. They were in their first semester at university, trying to familiarize themselves with the new teaching and learning environment. One of their biggest challenges was the academic requirements, which differed from their previous schooling level. They were asked to spend a certain amount of self-study time on several active activities before and after class to attain the expected academic achievements. In this study, the course General English 1 was designed for non-English-major freshmen on the Moodle platform, which was configured on the institution's e-learning server. It served as a "virtual extension of the face-to-face classroom" (Dang, 2012, p. 79), which accommodated learners' needs and offered opportunities for enhancement of language learning out of class.

A sample of 910 learners were of volunteer recruitment. Among them, 33.1% were male (n=301), 65.5% were female (n=596), and the remaining 1.4% (n=13) were of undefined gender identity. Their majors included education (n=242, 26.6%), engineering (n=205, 22.5%), tourism (n=37, 4.1%) and business (n=426, 46.8%). As regards learners' length of time in their English learning journey, the majority had spent more than nine years (n=498, 54.7%), followed by 34.9% (n=318) having spent from five to less than nine years and 10.3% (n=94) less than five years studying English.

Design of the Study

This study used quantitative research methods, including a survey, to examine how EFL learners perceive their TSE in online language learning.

The questionnaire construction on technology self-efficacy was based on the Computer Self-efficacy scale (Murphy et al., 1989; Howard, 2014); the Online Technologies Self-efficacy scale (Eastin and LaRose, 2000; Hao, 2016; Miltiadou & Yu, 2000) and Learning Management System self-efficacy scale (Martin et al., 2010). Two more items were self-developed in terms of using computers and LMS. After revisiting these items, the researchers divided them into three subscales, namely computer self-efficacy (CSE), Internet self-efficacy (ISE), and learning management system self-efficacy (LSE). This part of the survey started with "I would be confident…" followed by verb phrases. The respondents were asked to specify their extent of agreement by choosing a five-point Likert scale, stretching from Not confident at all (1) to Very confident (5). A list of the constructs and items is available in Appendix A.

The questionnaire was translated into the participants' native language, Vietnamese. This helped minimize the respondents' confusion and saved them time in completing the questionnaire. Back-translation was then employed. The Vietnamese version of the survey questionnaire was sent to two university lecturers in Vietnam. They were both Vietnamese, one obtaining a PhD in TESOL in New Zealand and the other holding a PhD in English studies in Vietnam. These two lecturers translated the Vietnamese version back into English. Then, the dissimilarities between the original English survey questionnaire and these two translated English versions were cautiously examined.

Fifty learners joining in the pilot stage were requested to complete the questionnaire to check the reliability of the items. It was then analyzed in SPSS version 27 to measure the Cronbach's α coefficient. The values of the Cronbach's α for the three constructs namely CSE, ISE and LSE were 0.892, 0.915 and 0.967 respectively, which showed good internal consistency reliability of the items.

Data collection & analysis

A non-probability sampling technique was adopted. To select the sample, a survey was sent to the Announcement Section of the General English 1 course in the LMS in the 14th week of the course, which was on December 18th, 2023. At the beginning of the survey, the research project was introduced. If the learners were willing to fill in the survey questionnaire, they ticked a consent box on the first page and then started filling out the questionnaire. All the respondents were informed of the research objectives and that their participation was voluntary and would not impact their study results. To increase the response rate from the learners, a reminder was sent to the Announcement Section a week later. In total, 941 learners completed the survey, which made up 58.96 percent of the course' enrolled learners. Once the data were screened to delete cases with missing values or inappropriate responses, 910 valid responses were retained for further analysis.

The data yielded by the survey questionnaire were coded and fed into a data file (SPSS version 27), from which exploratory factor analysis (EFA) was generated to gather evidence

of the measurement scale's validity and reliability. EFA is a "technique for identifying groups or clusters of variables" (Field, 2013, p. 628). In this study, EFA was conducted to extract possible clusters of the data collected from the 28 items for technology self-efficacy.

Kaiser Meyer-Olkin (KMO) and Bartlett's test of sphericity were generated to check the factorability of each section. The KMO statistic refers to "the ratio of the squared correlation between variables to the squared partial correlation between variable" (Field, 2013, p. 684). The KMO index ranges from 0 to 1, with a value close to 1 demonstrating that correlation patterns are relatively dense. Hence, factor analysis should produce distinct and relevant factors. As Hutcheson and Sofroniou (1999) recommended, values from 0.5 to 0.7 are mediocre, those from 0.7 to 0.8 are good, those from 0.8 to 0.9 are great, and those exceeding 0.9 are superb. Bartlett's test of sphericity examines the relationship between variables, and it is considered significant with $p < 0.05$ (Cohen et al., 2017). As presented in Table 1, the KMO for the questionnaire was superb, with 0.972, which verified the adequacy of the sampling for the analysis. The *p*-value in Bartlett's test was 0.000, which is smaller than 0.05, indicating that associations between the variables were large enough for principal component analysis (PCA), which is a multivariate technique for recognizing groups or clusters of variables (Field, 2013).

Table 1

KMO and Bartlett's test of the TSE scale

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.972
Bartlett's Test of Sphericity	Approx. Chi-Square	22420.888
	df	378
	Sig.	0.000

Next, Kaiser's criterion recommended that all the factors with eigenvalues greater than 1 should be retained (Kaiser, 1960). This was based on the idea that "the eigenvalue of a factor represents the amount of the total variance explained by that factor" (Pallant, 2016, p. 185). Hence, an eigenvalue of 1 indicates a substantial amount of variance. The result (see Appendix B) showed three factors of technology self-efficacy having eigenvalues above 1 (15.908, 1.936, and 1.308), which in combination described 68.404% of the variance.

Also, Horn's parallel analysis (1965) checked the number of factors to retain. This analysis compares the actual eigenvalues extracted from the original dataset and those from a random dataset. A factor is retained when the former is greater than the latter from the parallel data (O'Connor, 2000). Table 2 indicates that the first three actual eigenvalues were higher than those in the corresponding columns; thus, three factors were extracted.

Table 2

Comparison among actual, average, and percentile eigenvalues

Factors	Actual eigenvalues	Average eigenvalues	95^{th} percentile eigenvalues
1	15.908	1.336	1.383
2	1.936	1.287	1.318
3	1.308	1.252	1.281

PCA using Promax rotation was conducted on 28 items for learners' technology self-efficacy. The item loadings were suppressed to 0.4. The first-factor analysis showed that one item (ISE8) with factor loading was smaller than the cutoff value of 0.4. Moreover, the three items (LSE2, LSE3, LSE4) had high cross loadings. Hence, the items ISE8, LSE2, LSE3, and LSE4 were removed, and the factor analysis was rerun on the 24 remaining items. The factor loadings on the three components are shown in Table 3, with a total variance of 69.691 percent. The three clusters of items consisted of computer self-efficacy (5 items), Internet self-efficacy (8 items), and learning management system self-efficacy (11 items).

Table 3

Principal component analysis on 24 TSE items (ISE8, LSE2, LSE3, LSE4 removed)

	Component 1	Component 2	Component 3
LSE8	.923		
LSE13	.886		
LSE14	.885		
LSE15	.853		
LSE7	.851		
LSE9	.839		
LSE12	.794		
LSE6	.768		
LSE10	.768		
LSE5	.632		
LSE11	.604		
ISE6		.928	
ISE4		.913	
ISE3		.831	
ISE2		.714	
ISE1		.672	
ISE7		.663	
LSE1		.602	
ISE5		.572	
CSE3			.901
CSE4			.826
CSE2			.805
CSE1			.755
CSE5			.649

After factor analysis, internal consistency was examined. As revealed from Table 4, the values of Cronbach's alpha for the factors of computer self-efficacy (CSE), Internet self-efficacy (ISE), and learning management self-efficacy (LSE) were 0.899, 0.921, and 0.958, respectively, indicating high reliability for each factor within the data sample.

Table 4
Cronbach's α internal consistency

Constructs	Indicators	Cronbach's Alpha	Internal consistency
CSE	5	0.899	Good
ISE	8	0.921	Excellent
LSE	11	0.958	Excellent

Results/Findings

EFL learners' perceptions of technology self-efficacy

The respondents exhibited ratings for their confidence regarding different aspects of computer, Internet, and learning management system self-efficacy between 1 (not confident at all) and 5 (very confident). The descriptive analysis was conducted using mean (*M*) and standard deviation (SD). As guided by Ketsing (1995) and Srisaad & Nilkaew (1992), *M*=1.00 - 1.50 meaning very low, *M*=1.51 - 2.50 meaning low, *M*=2.51 - 3.50 meaning moderate, *M*=3.51 - 4.50 meaning high and *M*=4.51 - 5.00 meaning very high.

The descriptive analysis is presented in Table 5 below. As can be seen, the learners only showed their confidence in using the Internet to gather information (ISE6) at a high level with a mean score of 3.51, whereas their confidence in using MS Office such as MS Word, MS Excel, PowerPoint (CS3) was low with the mean score of 2.44. The remaining was at a moderate mean score of 2.59 and 3.18. Of concern across these items is large standard deviations around 1.1, indicating that the learners disclosed substantial dissimilarities in their confidence rating.

Regarding computer self-efficacy (5 items), the learners showed their confidence mostly in working on a personal computer (*M*=2.90), followed by organizing and managing files on the computer, persisting and completing most any computer-related task, and remaining calm when facing computer difficulties, with mean score values of 2.73, 2.68, and 2.59, respectively. They felt at least confident in using MS Office, as mentioned earlier.

In terms of Internet self-efficacy (8 items), except "using Internet to gather data" (ISE6), the remaining seven items, such as "opening a web browser," "clicking on a link to visit a specific website", "bookmarking a website", "downloading files from the Internet", "using emails to communicate", "learning advanced skills within a specific Internet program" and "logging in to my course in the LMS" received roughly similar ratings with the mean score being in the range of 2.91 - 3.18.

Finally, concerning the LMS self-efficacy (11 items), the learners expressed their confidence mostly in downloading the course documents to my computer (LSE11) with a mean value of 3.01. Their ratings for the rest ranged from 2.63 to 2.97.

Table 5

Descriptive analysis of the learners' technology self-efficacy (*N*=910)

	Min	Maxi	Mean	Std. Deviation	Variance	Interpretation	Skewness
CSE1	1	5	2.90	1.146	1.314	Moderate	0.161
CSE2	1	5	2.73	1.151	1.325	Moderate	0.264
CSE3	1	5	2.44	1.123	1.261	Moderate	0.472
CSE4	1	5	2.68	1.134	1.285	Moderate	0.294
CSE5	1	5	2.59	1.153	1.329	Moderate	0.329
ISE1	1	5	3.02	1.234	1.522	Moderate	0.009
ISE2	1	5	2.91	1.202	1.444	Moderate	0.067
ISE3	1	5	3.01	1.175	1.382	Moderate	0.056
ISE4	1	5	3.18	1.148	1.318	Moderate	-0.072
ISE5	1	5	2.92	1.189	1.414	Moderate	0.084
ISE6	1	5	3.51	1.130	1.278	High	-0.312
ISE7	1	5	3.09	1.156	1.336	Moderate	0.038
LSE1	1	5	3.14	1.141	1.302	Moderate	-0.030
LSE5	1	5	2.99	1.112	1.237	Moderate	0.120
LSE6	1	5	2.83	1.169	1.366	Moderate	0.150
LSE7	1	5	2.77	1.116	1.246	Moderate	0.300
LSE8	1	5	2.70	1.139	1.298	Moderate	0.300
LSE9	1	5	2.65	1.181	1.394	Moderate	0.334
LSE10	1	5	2.91	1.126	1.269	Moderate	0.217
LSE11	1	5	3.01	1.130	1.277	Moderate	0.145
LSE12	1	5	2.97	1.121	1.257	Moderate	0.144
LSE13	1	5	2.76	1.175	1.380	Moderate	0.276
LSE14	1	5	2.63	1.181	1.394	Moderate	0.333
LSE15	1	5	2.76	1.163	1.353	Moderate	0.264

Effect of demographic factors on perceived TSE

To provide more insights into the learners' perceptions of TSE, one-way ANOVA, and posthoc tests were performed to examine the possible correlation and effects of demographic features such as gender, major, and length of time studying English on their perceived level of TSE. These tests were utilized to determine statistical disparities between different groups by comparing the means of independent variables (Field, 2013). The eta squared values were also calculated to measure the effect size of the statistically significant difference.

Results from the ANOVA tests (Table 6) indicated that there was a statistically significant difference among the three gender groups (male, female, and unknown) in relation to LSE with F=10.035, p=0.000 < 0.05. The eta squared value was 0.022, which showed a small effect size. Moreover, there was no statistical significance between the gender groups in terms of CSE and ISE.

Table 6

Results of one-way ANOVA comparing learners' perceptions of TSE by gender

		Sum of Squares	df	Mean Square	F	Sig.	Eta squared
CSE	Between Groups	9.441	2	4.720	4.759	.009	
	Within Groups	899.559	907	.992			
	Total	909.000	909				
ISE	Between Groups	3.273	2	1.637	1.639	.195	
	Within Groups	90.727	907	.999			
	Total	909.000	909				
LSE	Between Groups	19.679	2	9.839	10.035	**.000**	**0.022**
	Within Groups	889.321	907	.981			
	Total	909.000	909				

Post-hoc analysis using Tukey's HSD was conducted to identify the variations in mean scores among the gender groups for the perceived TSE. Table 7 and Figure 2 reveal that the mean score for the female group was significantly different from the male group at the 0.05 level of significance with a mean difference of 0.31, p=0.000. However, there was no significant difference between the male and female and unknown groups. Generally, these results suggest that male learners are more confident in fulfilling LMS-related tasks than their female counterparts.

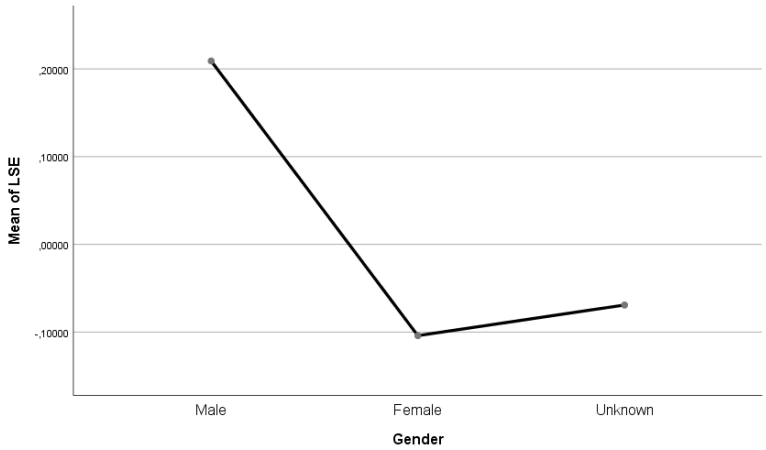
Table 7

Post-hoc comparisons for learners' perceptions of LSE by gender

Dependent Variable	(I) Gender	(J) Gender	Mean Difference (I-J)	Std. Error	Sig.
LSE	Male	Female	**.31317579***	.07001895	**.000**
		Unknown	.27827531	.28050180	.582
	Female	Male	**-.31317579***	.07001895	**.000**
		Unknown	-.03490048	.27761287	.991
	Unknown	Male	-.27827531	.28050180	.582
		Female	.03490048	.27761287	.991

Figure 2

Means plots for learners' perceptions of LSE by gender



Secondly, one-way ANOVA and post-hoc tests were conducted to investigate the effect of major groups on their perceptions of TSE, including education, engineering, tourism, and business. Results from the ANOVA tests (Table 8) show that there was a statistically significant difference between the four majors in CSE and LSE, with F=6.143, p=0.000, and F=5.595, p=0.001, respectively. The eta squared values were 0.02 and 0.018, which were small effect sizes. Moreover, there was no statistical significance between the major groups regarding ISE.

Table 8

Results of one-way ANOVA comparing learners' TSE by major

		Sum of Squares	df	Mean Square	F	Sig.	Eta squared
CSE	Between Groups	18.123	3	6.041	6.143	**.000**	**0.02**
	Within Groups	890.877	906	.983			
	Total	909.000	909				
ISE	Between Groups	4.222	3	1.407	1.409	.239	
	Within Groups	904.778	906	.999			
	Total	909.000	909				
LSE	Between Groups	16.535	3	5.512	5.595	**.001**	**0.018**
	Within Groups	892.465	906	.985			
	Total	909.000	909				

To recognize the disparities in mean scores among the four major groups for the CSE and LSE, a post-hoc analysis using Tukey's HSD was conducted. Table 9, Figure 3, and Figure 4 reveal that the mean score for engineering was significantly different from the other majors at the 0.05 level of significance. However, there was no significant difference between education, tourism, and business. These results suggest that the learners specializing in engineering were more confident in doing computer- and LMS-related tasks in their English learning process compared to those of other majors.

Figure 3

Means plots for learners' CSE by major

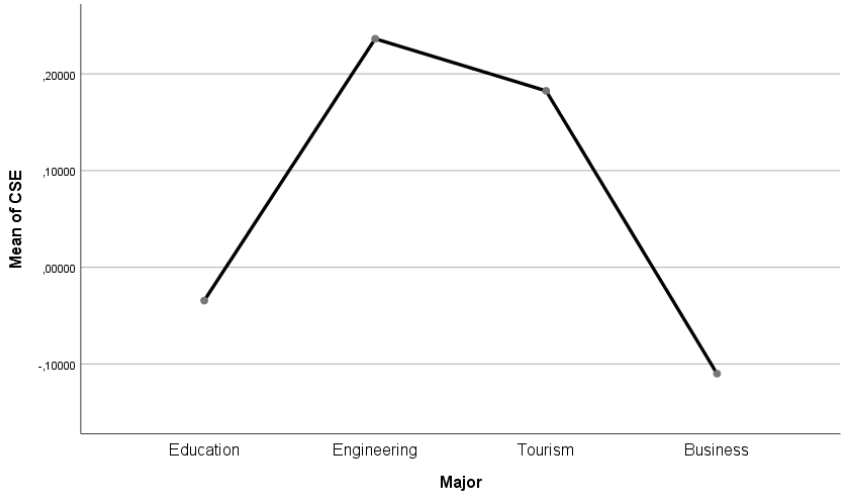


Table 9

Post-hoc comparisons for learners' TSE by major

Dependent Variable	(I) Major	(J) Major	Mean Difference (I-J)	Std. Error	Sig.
CSE	Education	Engineering	**-.27079290***	.09412695	**.021**
		Tourism	-.21688486	.17504044	.602
		Business	.07553468	.07982163	.780
	Engineering	Education	**.27079290***	.09412695	**.021**
		Tourism	.05390804	.17712291	.990
		Business	**.34632758***	.08429034	**.000**
	Tourism	Education	.21688486	.17504044	.602
		Engineering	-.05390804	.17712291	.990
		Business	.29241954	.16995333	.313
	Business	Education	-.07553468	.07982163	.780
		Engineering	**-.34632758***	.08429034	**.000**
		Tourism	-.29241954	.16995333	.313
LSE	Education	Engineering	**-.26345148***	.09421079	**.027**
		Tourism	-.29387478	.17519635	.336
		Business	.05159248	.07989273	.917
	Engineering	Education	**.26345148***	.09421079	**.027**
		Tourism	-.03042330	.17728067	.998
		Business	**.31504397***	.08436541	**.001**
	Tourism	Education	.29387478	.17519635	.336
		Engineering	.03042330	.17728067	.998
		Business	.34546726	.17010470	.177
	Business	Education	-.05159248	.07989273	.917
		Engineering	**-.31504397***	.08436541	**.001**
		Tourism	-.34546726	.17010470	.177

Figure 3

Means plots for learners' CSE by major

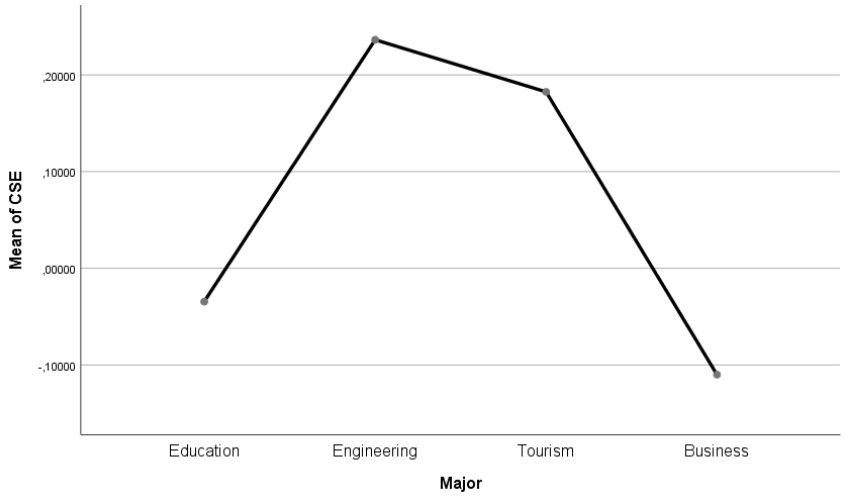
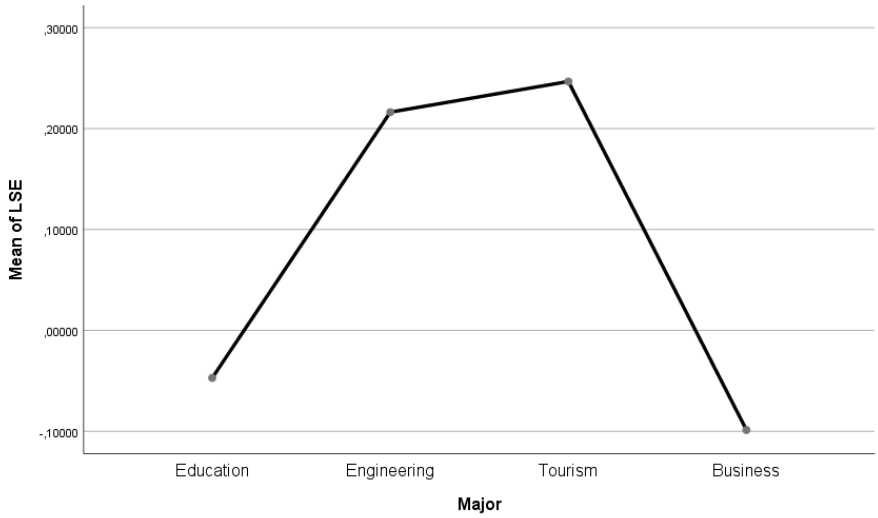


Figure 4
Means plots for learners' LSE by major



Thirdly, one-way ANOVA and post-hoc tests were carried out to examine the effect of the length of time EFL learners had spent learning English. Results from the ANOVA tests (Table 10) show no statistically significant difference among the three groups regarding the duration of studying English. This suggests that the length of time learning English had no significant effect on any of the learners' perceptions of TSE.

Table 10

Results of one-way ANOVA comparing learners' TSE by the length of time studying English

		Sum of Squares	df	Mean Square	F	Sig.
CSE	Between Groups	2.170	2	1.085	1.085	.338
	Within Groups	906.830	907	1.000		
	Total	909.000	909			
ISE	Between Groups	1.724	2	.862	.862	.423
	Within Groups	907.276	907	1.000		
	Total	909.000	909			
LSE	Between Groups	1.967	2	.984	.984	.374
	Within Groups	907.033	907	1.000		
	Total	909.000	909			

Discussion

This study was conducted to address the research questions of the EFL learners' perceptions of TSE in their online language learning experience. The results revealed an overall moderate belief of TSE. These findings partly echoed those of Lai (2008) and Luu and Pham (2022), targeting Asian undergraduates. This could be possibly explained by Asian culture, including Vietnamese culture, where teacher-led instruction has greatly affected learners' attitudes and beliefs. Moreover, due to the cultural emphasis on humbleness, it is possible that Vietnamese learners might have reported their self-efficacy at a moderate level (Kim et al., 2021).

Out of all the 24 items, the EFL learners felt most self-efficacious in using the Internet to gather information. This indicates that digital natives are likely to be good at Internet information seeking to serve their learning in online environments. This might be explained by their daily exposure to and usage of the Internet for both learning and other purposes.

Moreover, the results demonstrated no statistical significance between the gender groups in terms of CSE and ISE. This result supports, in part, the findings by Holcomb et al. (2004), Keengwe (2007), Pham et al. (2021), and Wang et al. (2009), showing no gender differences for self-efficacious beliefs regarding the use of computers and Internet. However, there were gender variations in LSE between male and female groups, which suggests that male undergraduates showed more confidence in doing LMS tasks than their female counterparts. This finding contradicts Rezki's (2018) and Kraja and Muka's (2023) research, which found no significant dissimilarities regarding the effect of gender on learners' LSE.

Regarding the effect of studying majors on TSE, the difference between the CSE and LSE was statistically significant in favor of the learners specializing in engineering. As a comparison, our finding is in partial agreement with some previous research such as Mekhzoumi et al. (2018) and Pham et al. (2021), which unveiled some impact of study majors on learners' self-efficacy. A possible explanation for this result might be more exposure and experience with computers and LMS gained by the learners majoring in engineering compared to those of other majors.

Interestingly, this study detected no significant effect of the length of time studying English on any of the learners' perceptions of TSE. However, with few research projects exploring this impact, the results should be interpreted with caution.

Conclusion

In summary, the purpose of the study was to measure the confidence of Vietnamese EFL undergraduates concerning the use of technology for online language learning as well as its relationship with gender, major, and length of time studying English. The study showed that the learners reported their TSE at a moderate level. Furthermore, the research detected gender variations in relation to LSE between male and female learners. The learners majoring in engineering had higher mean scores regarding CSE and LSE than their counterparts. The study also indicated no significant correlation between learners' time studying English and their confidence in using technology in their learning process. Bearing in mind that self-efficacy plays a critical role in the online learning process (Peterson & Arnn, 2004), it is essential to enhance learners' TSE level so that they can make the best use of technological tools for their knowledge acquisition. Accordingly, more orientations, training sessions, and thorough instructions should be provided to the freshmen as they offer guidelines and opportunities for learners to familiarize themselves with the LMS and its features, boosting their self-efficacy regarding technology uptake. Regardless of its important contribution, this research reveals some limitations regarding collecting quantitative data at one point in time, as learners' perceptions of self-efficacy are not static but dynamic in nature. Therefore, it is necessary to include qualitative data from a longitudinal perspective in future research to

obtain better results for interpretation. Another limitation of the study was that the data collected was restricted to the local EFL population of an academic institution; hence, future work can be conducted with a variety of samples regarding age, geography, and culture.

In short, this study provides both theoretical and practical insights. Firstly, the findings extend further support to prior research on learners' confidence in technology use in online learning mode. Furthermore, the insights provided in this study are significant for institution leaders, program developers, and lecturers to understand EFL learners' TSE for online language learning.

References

Al-Harthi, A. S. A. (2016). Technological self-efficacy among school leaders in Oman: A preliminary study. *Journal of Further and Higher Education, 41*(6), 760-772. https://doi.org/10.1080/0309877x.2016.1177168

Alqurashi, E. (2016). Self-efficacy in online learning environments: A literature review. *Contemporary Issues in Education Research (CIER), 9*(1), 45-52. https://doi.org/10.19030/cier.v9i1.9549

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual review of psychology*, *52*(1), 1-26. https://doi.org/10.1146/annurev.psych.52.1.1

Bates, R., & Khasawneh, S. (2004, March 3-7). *A path analytic study of the determinants of college students' motivation to use online learning technologies* [Paper presentation]. Academy of Human Resource Development International Conference, Austin, Texas, United States. Retrieved from http://files.eric.ed.gov/fulltext/ED492503.pdf

Cai, J., Yang, H. H., Gong, D., MacLeod, J., & Zhu, S. (2019). Understanding the continued use of flipped classroom instruction: a personal beliefs model in Chinese higher education. *Journal of Computing in Higher Education, 31*(1), 137–155. https://doi.org/10.1007/s12528-018-9196-y

Chang, S. C., & Tung, F. C. (2008). An empirical investigation of students' behavioural intentions to use the online learning course websites. *British Journal of Educational Technology, 39*(1), 71-83. https://doi.org/10.1111/j.1467-8535.2007.00742.x

Chen, I. S. (2017). Computer self-efficacy, learning performance, and the mediating role of learning engagement. *Computers in Human Behavior, 72*, 362-370. https://doi.org/10.1016/j.chb.2017.02.059

Chien, T. (2012). Computer self-efficacy and factors influencing e-learning effectiveness. *European Journal of Training and Development, 36*(7), 670–686. https://doi.org/10.1108/03090591211255539

Clark, D., Nelson, B., Sengupta, P., & D'Angelo, C. (2009, October). *Rethinking science learning through digital games and simulations: Genres, examples, and evidence*. [Paper presentation]. National Research Council Workshop on Learning science through

computer games, simulations, Washington, DC, the USA.

Cohen, L., Manion, L., & Morrison, K. (2017). Factor analysis, cluster analysis and structural equation modelling. In *Research methods in education* (pp. 818-838). Routledge.

Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly, 19*(2), 189–211. https://doi.org/10.2307/249688

Christensen, R., Knezek, G., & Tyler-Wood, T. (2015). Alignment of hands-on STEM engagement activities with positive STEM dispositions in secondary school students. *Journal of Science Education and Technology, 24*(6), 898-909. https://doi.org/10.1007/s10956-015-9572-6

Doan, T. T. T. (2021). The effect of perceived risk and technology self-efficacy on online learning intention: An empirical study in Vietnam. *The Journal of Asian Finance, Economics and Business, 8*(10), 385-393. https://doi.org/10.13106/jafeb.2021.vol8.no10.0385

Durndell, A., & Haag, Z. (2002). Computer self-efficacy, computer anxiety, attitudes towards the Internet and reported experience with the Internet, by gender, in an East European sample. *Computers in human behavior, 18*(5), 521-535. https://doi.org/10.1016/S0747-5632(02)00006-7

Eastin, M. S., & LaRose, R. (2000). Internet self-efficacy and the psychology of the digital divide. *Journal of Computer-Mediated Communication, 6*(1), JCMC611. https://doi.org/10.1111/j.1083-6101.2000.tb00110.x

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. https://doi.org/10.1080/15391523.2010.10782551

Field, A. (2013). *Discovering statistics using IBM SPSS statistics* (4th ed.). London: Sage.

Gist, M., & Mitchel, T. R. (1992). Self-efficacy: A theoretical analysis of its determinants and malleability. *Academy Management Review, 17*(2), 183–211. https://doi.org/10.5465/amr.1992.4279530

Goodman, P. S. (2001). *Technology enhanced learning: Opportunities for change (1st ed.).* New York, Routledge. https://doi.org/10.4324/9781410601933

Hao, Y. (2016). Exploring undergraduates' perspectives and flipped learning readiness in their flipped classrooms. *Computers in Human Behavior*, *59*, 82-92. https://doi.org/10.1016/j.chb.2016.01.032

Ho, N. T. T., Sivapalan, S., Pham, H. H., Nguyen, L. T. M., Pham, A. T. V., & Dinh, H. V. (2020). Students' adoption of e-learning in emergency situation: The case of a Vietnamese university during COVID-19. *Interactive Technology and Smart Education, 18*(2), 246-269. https://doi.org/10.1108/ITSE-08-2020-0164

Holcomb, B., Bailey, J. M., Crawford, K., & Ruffin, M. T. (2004). Adults' knowledge and

behaviors related to human papillomavirus infection. *The Journal of the American Board of Family Practice*, *17*(1), 26-31. https://doi.org/10.3122/jabfm.17.1.26

Hsu, M. K., Wang, S. W., & Chiu, K. K. (2009). Computer attitude, statistics anxiety and self-efficacy on statistical software adoption behavior: An empirical study of online MBA learners. *Computers in Human Behavior, 25*(2), 412-420. https://doi.org/10.1016/j.chb.2008.10.003

Hutcheson, G. and Sofroniou, N. (1999) The multivariate social scientist: Introductory statistics using generalized linear models. Thousand Oaks, CA: Sage Publication. https://doi.org/10.4135/9780857028075

Hwang, Y., Lee, Y., & Shin, D. H. (2016). The role of goal awareness and information technology self-efficacy on job satisfaction of healthcare system users. *Behaviour & Information Technology, 35*(7), 548-558. https://doi.org/10.1080/0144929X.2016.1171396

Isman, A., & Celikli, G. E. (2009). How does student ability and self-efficacy affect the usage of computer technology? *Turkish Online Journal of Educational Technology*, *8*(1), 33-38. http://www.tojet.net/articles/v8i1/814.pdf

Jia, D., Bhatti, A., & Nahavandi, S. (2014). The impact of self-efficacy and perceived system efficacy on effectiveness of virtual training systems. *Behaviour & Information Technology, 33*(1), 16-35. https://doi.org/10.1080/0144929X.2012.681067

Jokisch, M. R., Schmidt, L. I., Doh, M., Marquard, M., & Wahl, H. W. (2020). The role of internet self-efficacy, innovativeness and technology avoidance in breadth of internet use: Comparing older technology experts and non-experts. *Computers in Human Behavior, 111*, 106408. https://doi.org/10.1016/j.chb.2020.106408

Joo, Y. J., Bong, M., & Choi, H. J. (2000). Self-efficacy for self-regulated learning, academic self-efficacy, and internet self-efficacy in web-based instruction. *Educational Technology Research and Development, 48*(2), 5-17. https://doi.org/10.1007/BF02313398

Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and psychological measurement*, *20*(1), 141-151. https://psycnet.apa.org/doi/10.1177/001316446002000116

Keengwe, J. (2007). Faculty integration of technology into instruction and students' perceptions of computer technology to improve student learning. *Journal of Information Technology Education: Research, 6*(1), 169-180. https://www.learntechlib.org/p/111414/

Kennedy, G., Krause, K.-L., Judd, T., Churchward, A., & Gray, K. (2008). First-year students' experiences with technology: Are they really digital natives? *Australasian Journal of Educational Technology, 24*(1), 108–122. https://doi.org/10.14742/ajet.1233

Ketsing, W. (1995). Means and the interpretations. *Research in Education, 18*(3), 8-11.

Kim, D.-H., Wang, C., & Truong, N. T. N. (2021). Psychometric properties of a self-efficacy scale for English language learners in Vietnam. *Language Teaching Research, 5*(6),

201-223. https://doi.org/10.1177/13621688211027852

Kraja, P., & Muka, R. (2023). Self-efficacy of higher education students during online learning. *Proceedings of Karadeniz 14th International Conference on Social Sciences*, 22, 22-36. Retrieved from https://www.karadenizkongresi.org/_files/ugd/797a84_70a0cfd1a09c4eddabdb9d65027fc50b.pdf

Lai, M. L. (2008). Technology readiness, internet self-efficacy and computing experience of professional accounting students. *Campus-Wide Information Systems, 25*(1), 18-29. https://doi.org/10.1108/10650740810849061

Lai, C., & Gu, M. (2011). Self-regulated out-of-class language learning with technology. *Computer-assisted language learning, 24*(4), 317-335. https://doi.org/10.1080/09588221.2011.568417

Lai, C., Wang, Q., & Lei, J. (2012). What factors predict undergraduate students' use of technology for learning? A case from Hong Kong. *Computers & Education, 59*(2), 569-579. https://doi.org/10.1016/j.compedu.2012.03.006

Luu, T. M. V., & Pham, T. S. T. (2022). An analysis of online learning self-efficacy in the case of Vietnamese university students. *Ho Chi Minh City Open University Journal of Science-social Sciences*, *12*(1), 40-49. https://doi.org/10.46223/HCMCOUJS.soci.en.12.1.2145.2022

Madden, O., Sweeney, R., & Gonzales, A. (2023).Exploring the Use of Live Interactive Worksheets in Foreign Language Classes:Perceptions of Students and Teachers. *International Journal of Language Instruction, 2*(4), 1-18. https://doi.org/10.54855/ijli.23241

Martin, F., Tutty, J. I., & Su, Y. (2010). Influence of Learning Management Systems self-efficacy on e-learning performance. *Journal on School Educational Technology*, *5*(3), 26-35. https://doi.org/10.26634/jsch.5.3.1086

Marakas, G. M., Yi, M. Y., & Johnson, R. D. (1998). The multilevel and multifaceted character of computer self-efficacy: Toward clarification of the construct and an integrative framework for research. *Information systems research, 9*(2), 126-163. https://doi.org/10.1287/isre.9.2.126

McDonald, T., & Siegall, M. (1992). The effects of technological self-efficacy and job focus on job performance, attitudes, and withdrawal behaviors. *Psychology; Interdisciplinary and Applied 126*(5), 465–475. https://doi.org/10.1080/00223980.1992.10543380

Mekhzoumi, O., bin Hamzah, M. H., & Krishnasamy, H. N. (2018). Determinants of mobile applications acceptance for English language learning in Universiti Utara Malaysia. *Journal of Advanced Research Design*, *51*(1), 1-13. Retrieved from https://www.akademiabaru.com/submit/index.php/ard/article/view/4884

Miltiadou, M., & Yu, C. H. (2000). *Validation of the online technologies self-efficacy scale (OTSES)*. Article ED445672. https://eric.ed.gov/?id=ED445672

Mikusa, M. E. (2015). *The effect of technology self-efficacy and personal engagement on students' and teachers' attitudes toward technology use in education.* [Doctoral dissertation, Appalachian State University]. Retrieved from https://libres.uncg.edu/ir/asu/f/Mikusa.pdf

Multon, K. D., Brown, S. D., & Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. *Counseling Psychology*, *38*(1), 30-38. https://doi.org/10.1037/0022-0167.38.1.30

Murphy, C. A., Coover, D., & Owen, S. V. (1989). Development and validation of the computer self-efficacy scale. *Educational and Psychological Measurement*, *49*(4), 893-899. http://dx.doi.org/10.1177/001316448904900412

Nguyen, T. D. T., & Pham, V. P. H.(2022). Effects of using technology to support students in developing speaking skills. *International Journal of Language Instruction, 1*(1),1-8. https://doi.org/10.54855/ijli.22111

O'Connor, B. P. (2000). SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. *Behavior Research Methods, Instruments, & Computers* **32**, 396–402. https://doi.org/10.3758/BF03200807

Pallant, J. F., Haines, H. M., Green, P., Toohill, J., Gamble, J., Creedy, D. K., & Fenwick, J. (2016). Assessment of the dimensionality of the Wijma delivery expectancy/experience questionnaire using factor analysis and Rasch analysis. *BMC pregnancy and childbirth*, *16*, 1-11. https://doi.org/10.1186/s12884-016-1157-8

Pan, X. (2020). Technology acceptance, technological self-efficacy, and attitude toward technology-based self-directed learning: learning motivation as a mediator. *Frontiers in Psychology*, *11*, 564294. https://doi.org/10.3389/fpsyg.2020.564294

Peterson, T. O., & Arnn, R. B. (2005). Self-efficacy: The foundation of human performance. *Performance Improvement Quarterly*, *18*(2), 5-18. Retrieved from https://eric.ed.gov/?id= EJ846211

Plumm, K. M. (2008). Technology in the classroom: Burning the bridges to the gaps in gender-biased education?. *Computers & Education*, *50*(3), 1052-1068. https://doi.org/10.1016/j.compedu.2006.10.005

Pham, T., Lai, P.., & Nguyen, V. (2021, December). Exploring relationships between learners' Internet self-efficacy, online self-regulation, and interaction during online learning amid COVID-19 in Vietnam. In *Proceedings of the AsiaCALL International Conference* (Vol. 621, pp. 121-134). Vietnam: Hoa Sen University. https://doi.org/10.2991/assehr.k.211224.013

Punch, K. F. (2013). *Introduction to social research: Quantitative and qualitative approaches*. Sage.

Qashou, A. (2021). Influencing factors in M-learning adoption in higher education. *Education and information technologies, 26*(2), 1755-1785. https://doi.org/10.1007/s10639-020-10323-z

Reinders, H., & White, C. (2011). Learner autonomy and new learning environments. *Language Learning and Technology, 15* (3), 1-3. Retrieved from https://hdl.handle.net/10652/2497

Rezki, A. (2018). Students' self-efficacy of Nicenet in EFL Classroom. *Langkawi: Journal of The Association for Arabic and English*, *3*(2), 175-184.

Rivers, D. J. (2021). The role of personality traits and online academic self-efficacy in acceptance, actual use and achievement in Moodle. *Education and Information Technologies, 26*(4), 4353-4378. https://doi.org/10.1007/s10639-021-10478-3

Saville, J. D., & Foster, L. L. (2021). Does technology self-efficacy influence the effect of training presentation mode on training self-efficacy? *Computers in Human Behavior Reports*, *4*, 100-124. https://doi.org/10.1016/j.chbr.2021.100124

Schunk, D. H., & Pajares, F. (2002). The development of academic self-efficacy. In A. Wigfield, J. S. Eccles, U. Schiefele, R. W. Roeser, & P. Davis-Kean, *Development of achievement motivation* (pp. 15-31). Academic Press. https://doi.org/10.1016/B978-012750053-9/50003-6

Shakarami, A., Khajehei, H., & Hajhashemi, K. (2013). Digital self-efficacy and language learning enhancement in an online setting. *Journal of Basic and Applied Scientific Research (JBASR)*, *3*(11), 80-84. Retrieved from http://www.textroad.com/pdf/JBASR/J.%20Basic.%20Appl.%20Sci.%20Res.,%203(11)80-84,%202013.pdf

Shu, Q., Tu, Q., & Wang, K. (2011). The impact of computer self-efficacy and technology dependence on computer-related technostress: A social cognitive theory perspective. *International Journal of Human-Computer Interaction*, *27*(10), 923-939. https://doi.org/10.1080/10447318.2011.555313

Srisaad, B., & Nilkaew, B. (1992). Population referencing when using rating scale with samples. *Journal of Educational Evaluation, Srinakharinwirot University, Mahasarakham Campus, 3*(1), 22-25.

Sun, P., Tsai, R., Finger, G., Chen, Y., & Yeh, D. (2008). What drives a successful e-learning?: An empirical investigation of the critical factors influencing learner satisfaction. *Computers & Education, 50*(4), 1183–1202. https://doi.org/10.1016/j.compedu.2006.11.007

Teo, T., & Van Schaik, P. (2012). Understanding the intention to use technology by preservice teachers: An empirical test of competing theoretical models. International *Journal of Human-Computer Interaction, 28*(3), 178-188. https://doi.org/10.1080/10447318.2011.581892

Terzis, V., & Economides, A. A. (2011). The acceptance and use of computer-based assessment. *Computers & Education, 56*(4), 1032-1044. https://doi.org/10.1016/j.compedu.2010.11.017

Tsai, M. J., & Tsai, C. C. (2003). Information searching strategies in web-based science

learning: The role of Internet self-efficacy. *Innovations in education and teaching international, 40*(1), 43-50. https://doi.org/10.1080/1355800032000038822

Venkatesh, V., & Davis, F. D. (1996). A model of the antecedents of perceived ease of use: Development and test. *Decision sciences, 27*(3), 451-481. https://doi.org/10.1111/j.1540-5915.1996.tb00860.x

Wang, L., Ertmer, P., & Newby, T. (2004). Increasing pre-service teachers‘ self-efficacy beliefs for technology integration. *Journal of Research on Technology in Education, 36*(3), 231-250. https://doi.org/10.1080/15391523.2004.10782414

Wang, C. H., Shannon, D. M., & Ross, M. E. (2013). Students’ characteristics, self-regulated learning, technology self-efficacy, and course outcomes in online learning. *Distance Education, 34*(3), 302-323. https://doi.org/10.1080/01587919.2013.835779

Wei, H. C., & Chou, C. (2020). Online learning performance and satisfaction: do perceptions and readiness matter? *Distance Education*, *41*, 48–69. https://doi.org/10.1080/01587919.2020.1724768

Wilfong, J. D. (2006). Computer anxiety and anger: The impact of computer use, computer experience, and self-efficacy beliefs. *Computers in Human Behavior*, *22*(6), 1001-1011. https://doi.org/10.1016/j.chb.2004.03.020

Whitty, M. T., & McLaughlin, D. (2007). Online recreation: The relationship between loneliness, Internet self-efficacy and the use of the Internet for entertainment purposes. *Computers in human behavior, 23*(3), 1435-1446. https://doi.org/10.1016/j.chb.2005.05.003

Wood, R., & Bandura, A. (1989). Social cognitive theory of organizational management. *Academy of Management Review*, *14*(3), 361-384. https://doi.org/10.5465/amr.1989.4279067

Zheng, Y., Wang, J., Doll, W., Deng, X., & Williams, M. (2018). The impact of organisational support, technical support, and self-efficacy on faculty perceived benefits of using learning management system. *Behaviour & Information Technology, 37*(4), 311-319. https://doi.org/10.1080/0144929X.2018.1436590

Zimmerman, W. A., & Kulikowich, J. M. (2016). Online learning self-efficacy in students with and without online learning experience. *American Journal of Distance Education, 30*(3), 180-191. https://doi.org/10.1080/08923647.2016.1193801

Biodata

Do Thi Thuy Linh is a PhD student in English Studies at Hanoi University, Vietnam. She has 18 years of teaching English at Haiphong University. Her research interests include ICT in language teaching, learner autonomy, technology self-efficacy and cross-cultural communication in higher education.

Associate Professor Pham Ngoc Thach is the Chairman of the Board of Trustees, Hanoi University, Vietnam. He has more than 30 years of teaching English at different levels of

study and in different environments: in class, online, on television and radio. Assoc. Prof. Pham completed his PhD at Victoria University, Melbourne, Australia early 2015. His strong interests are in using technologies for English language teaching and learning, university governance, educational knowledge management, educational material development and teacher training.

Dr. Ngo Phuong Anh specializes in Applied Linguistics. She completed her M.A study in Linguistics in Sweden in 2007 and received her Ph.D. degree in Applied Linguistics at the University of Reading, England in 2012. Her research interests pertain to English language pedagogy, general English linguistics. She supervises research in the areas of language teaching. She is currently the Acting Director of Centre for Foreign Language Assessment and Culture Exchange, HUST.

Appendix A

EFL Learners' Perceptions of Technology Self-efficacy

No.	Construct	Items I would feel confident……	No confidence	Little confidence	Some confidence	Confidence	High confidence
1	Computer self-efficacy (CSE)	working on a personal computer.					
2		organizing and managing files on the computer.					
3		using MS Office (MS Word, MS Excel, PowerPoint).					
4		persisting and completing most any computer-related task.					
5		remaining calm when facing computer difficulties because I can rely on my abilities.					
6	Internet self-efficacy (ISE)	opening a web browser (e.g. Explorer, Chrome, Firefox).					
7		clicking on a link to visit a specific website.					
8		bookmarking a web site.					
9		downloading files from the Internet.					
10		using email to communicate.					
11		using Internet to gather information.					
12		learning advanced skills within a specific Internet program.					
13		troubleshooting Internet problems.					
14	Learning management system self-efficacy (LSE)	logging in to my course in the Learning Management System.					
15		reading the text-based announcements posted by my instructor.					

16		viewing the course documents online.					
17		accessing the links to the web resources.					
18		viewing the feedback for the online test/quiz.					
19		viewing my grades in the grade book.					
20		taking a test/quiz online.					
21		posting text messages in the discussion group.					
22		creating a new thread in the discussion group.					
23		submitting assignments online.					
24		downloading the course documents to my computer.					
25		exchanging files with my group members.					
26		joining a virtual class or conferencing session.					
27		posting my reflection to a blog.					
28		collaborating on web pages to add the content and foster interactive engagements.					

Appendix B

Total variance explained for 28 items related to technology self-efficacy

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.908	56.815	56.815	15.908	56.815	56.815	8.217	29.348	29.348
2	1.936	6.916	63.731	1.936	6.916	63.731	6.398	22.850	52.198
3	1.308	4.673	68.404	1.308	4.673	68.404	4.537	16.205	68.404
4	0.876	3.130	71.533						
5	0.702	2.508	74.042						
6	0.584	2.084	76.126						
7	0.546	1.950	78.076						
8	0.510	1.822	79.898						
9	0.475	1.696	81.594						
10	0.430	1.535	83.129						
11	0.399	1.425	84.554						
12	0.368	1.313	85.867						
13	0.342	1.221	87.087						
14	0.329	1.176	88.264						
15	0.321	1.147	89.411						
16	0.313	1.117	90.527						
17	0.294	1.050	91.577						
18	0.277	0.988	92.565						
19	0.270	0.963	93.528						
20	0.243	0.868	94.396						
21	0.237	0.845	95.241						
22	0.227	0.810	96.052						
23	0.216	0.772	96.824						
24	0.205	0.732	97.556						
25	0.188	0.671	98.226						
26	0.177	0.632	98.859						
27	0.162	0.579	99.437						
28	0.158	0.563	100.000						

Extraction Method: Principal Component Analysis.