

Technology-Enabled Language Learning: Mediating Role of Collaborative Learning

Divya Jyot Kaur ¹, Niraja Saraswat ², Irum Alvi ³

¹ Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur, Rajasthan, India

² Malaviya National Institute of Technology, Jaipur, India

³ Rajasthan Technical University, Kota, India

ABSTRACT

Background. Technology-Enabled Language learning (TELL) encourages peer communication and collaboration through its innovative instructional methods. Collaborative student activities are recognised as an important component of the instructional approach of higher education. More recently, collaborative learning in conjunction with digital teaching tools has emerged as a preferred SLA pedagogical approach. Despite growing interest in TELL, research into the effects of collaborative learning on affective factors in SLA remains unexplored.

Purpose. The aim of the proposed study is to identify factors influencing the behavioral intention of students to use WhatsApp for second language acquisition. Constructs from previous models: performance expectancy, effort expectancy, and perceived relevance (UTAUT) are tested, along with the mediating role of a new variable 'collaborative learning'.

Method. Using the convenience sampling technique, the sample comprises 202 undergraduates studying in Institutes in Rajasthan, India. Data collected through Google forms was analyzed through IBM SPSS ver. 26 and Smart-PLS ver. 3.2.9, using structural equation modeling.

Results. A positive and significant relationship was established between all the selected constructs. The indirect effects were positive, yet less significant than the direct effects. Moreover, the partially mediating effect of collaborating learning was affirmed. Empirical data confirms that collaborative learning acts as a mediating variable enhancing the intention to use WhatsApp for SLA.

Conclusion. The present study makes an original and innovative contribution to language studies by analysing the relationship between the predictors. Such a systematic understanding of the topic can assist instructors in designing robust future pedagogical techniques.

KEYWORDS

UTAUT, technology, WhatsApp, second language acquisition, collaborative learning, mediation

Citation: Kaur D. J., Saraswat N., & Alvi I. (2023). Technology-enabled language learning: Mediating role of collaborative learning. *Journal of Language and Education*, 9(1), 89-101. <https://doi.org/10.17323/jle.2023.12359>

Correspondence:

Divya Jyot Kaur,
divyajyotdjk@gmail.com

Received: May 01, 2021

Accepted: Mach 15, 2023

Published: March 31, 2023



INTRODUCTION

In the 21st century, the concept of technology has introduced new connotations, changing lives and transforming the way people communicate with one another. Due to COVID-19, online education superseded traditional classroom instruction as the preferred method of instruction, and this shift in the mode of education became one of the most significant academic changes (Sharma & Alvi, 2021). This has caused a spike in education programmes offered online and a need for better articulation of technol-

ogy and pedagogy in higher education (Divjak et al., 2022).

Since learners today are digital natives, technology-enabled language learning allows them to learn as per their interest, and it also appeals to both the optical and the acoustic perceptions of learners (Kaur et al., 2021). Consequently, educators have worked to incorporate new technologies that engage students in active and creative learning rather than being passive knowledge beneficiaries (Chen Hsieh, 2022). Given the global situation during the COVID-19 pandemic, educators began to investigate methods

of collaborative work among students who were geographically dispersed from one another. Thus, the current educational emphasis has shifted significantly from individual to active collaborative learning (Dashkina et al., 2022)

Active collaborative learning is a continuous process in which students communicate and share views and ideas through social media Alismaiel et al. (2022). TELL encourages collaborative learning by encouraging students to interact with and learn from their peers, identifying their mistakes, increasing motivation, and being interesting (Zhang et al., 2022). Teachers with digital tools and devices employ different ways of practicing learning activities when compared with those in traditional classrooms. They can use a variety of strategies and practices to successfully implement collaborative learning (Pietarinen et al., 2021).

Easy access to mobile devices, social networking sites (SNSs) which can meet the needs of people, have become essential in our everyday lives. With the rising number of users, some SNSs have grown in popularity and have become common contact networks. As these platforms are synchronous, they allow users to receive as well as provide instructional support in real time (Miguel & Carney, 2022). The preferred app is WhatsApp, referred to as 'a simple social network' (Fischer, 2013). WhatsApp facilitates better communication and collaboration with others in your phone book, either personally or in groups. It has begun to be studied academically because of its ability to affect teaching and learning processes by extending the spatial and temporal borders of the classrooms and allowing teachers to communicate with students anywhere (Fouz-González, 2017). In terms of adaptability, it allows students to easily access online learning, if they have internet access and a mobile device, even when they live in a remote area.

Digital initiatives have now amplified and contributed enormously to pedagogy and the learning ability of students using hybrid pedagogies. They have also enhanced their online competencies. The creation of such planned blended pedagogies by educators has led to a resolution of the uncertainties of virtual learning. However, in Asian English language classrooms, the teacher-centered approach and rote learning are routine, with less focus on interactive student-centered learning in the language-learning process (Fischer & Yang, 2022). Therefore, the current research focuses on students' intentions to adopt TELL with the mediating effect of collaborative learning, in order to better prepare practitioners to use digital tools for collaborative learning in English language classrooms.

Purpose and Research Questions

Given the complex and multifaceted challenges of the transformation to digital learning in India, it was fairly obvious that the need for new solutions to optimise educational activities has increased. With the growing importance of

higher inclusive education in today's world and the scarcity of studies on adoption and intent to use TELL, the findings of this study can help with the implementation of strategic pedagogical planning in this direction at the national and regional levels. The proposed study is one of few to modify and extend the constructs of UTAUT (Venkatesh *et al.*, 2003) which assess the mediating role of collaborative learning in acceptance of technology (WhatsApp) for second language acquisition. The study is further distinguished by the addition of a new variable: collaborative learning. Collaborative learning is an emerging topic for educational studies. The concept is premised in the idea that learning occurs as a result of interactions between people and their surroundings. This social process serves as the foundation for collaborative learning. In this regard, the online world, as an interaction space, is a natural and dynamic learning domain (Herrera-Pavo, 2021). The research questions for this study are as follows:

- (1) Do the selected constructs have a direct and affirmative impact on collaborative learning as a mediating variable in acceptance of WhatsApp for second language acquisition?
- (2) Do the selected constructs have an indirect and affirmative effect on behavioral intention towards the use of WhatsApp for second language acquisition?
- (3) Do the selected constructs have an indirect and affirmative effect on user intention towards the use of WhatsApp for second language acquisition?

LITERATURE REVIEW

Technology-Enabled Language Learning

The teaching of the English language itself has experienced a remarkable transformation in the last decade in particular (Mofareh, 2019). In the wake of the pandemic, there have been extraordinary transformations across various fields, so it is indispensable that English language teaching keeps pace with the global technological revolution, in order to continue training in a systematic and advanced way (Ko & Lim, 2022). The diverse nature of educational technology makes TELL a versatile discipline. It supersedes conventional concepts & rules and provides a creative learning environment, reflected in the practices that extend ELT pedagogy (Sharifi et al., 2018). Today's students are tech-savvy and multi-taskers, to be more open to innovative and stimulating teaching styles that incorporate cutting-edge technology in the classroom (Fischer & Yang, 2022). Traditional lecturing models, for example, which attempt to cram dozens of students into one class despite the economic gains, are no longer acceptable to digital-age Gen Z students (Sixto-García & Duarte-Melo, 2020).

Several studies have highlighted the advantage of technology for English language learning. The purpose is not only to keep learners engaged but also to encourage the motivation of learners and learner-centered education (Zhang et al., 2022). The learner is able to direct their own educational plan, construct meaning, and monitor and improve their own work (Dashkina et al., 2022). Research conducted (Sun & Gao, 2019) to explore the relationships between motivation, technology adoption factors, and behavioral intention indicate that adequate instructional design compatible with and promoting the mission of language learning is necessary, in order to enhance students' behavioral intention to make use of technology for language learning.

Social Networking Sites (SNS)

The more educational content developed through already widely used SNSs, the greater their potential to influence education. As a result, they need to be incorporated into education, in order to realise their full potential. These platforms are synchronous, allowing participants to receive and provide instruction and feedback in real time (Miguel & Carney, 2022). Since online education during the pandemic has become the 'new normal', students are bored of traditional forms of learning and are open to new and innovative learning styles. Therefore, SNSs offer new possibilities for the modern requirements of the new generation (Toyama & Yamazaki, 2021).

Several studies have shown that SNSs promote educational programs by facilitating engagement, teamwork, constructive involvement, knowledge and data sharing, as well as critical thinking (Çetinkaya & Sütçü, 2018). The evolutionary interest of social networking and social interaction is an important aspect of digital technology. People now communicate globally in synchronous and asynchronous environments via mobile applications. This would have been just a vision a few years ago. Social networks are referred to as 'affinity space' in which individuals learn both social and communicative skills (Mellati et al., 2018).

WhatsApp and Collaborative Learning

WhatsApp was created for smartphones and tablets and seeks to facilitate general connectivity, provide image, audio, and video sharing, and a host of helpful features such as community formation (Cetinkaya & Sutcu, 2019). In particular, their great effect on young people's social development makes it important to assess their effect on scholastic development and their aspirations (Kaur et al., 2021). WhatsApp has become the most commonly used platform to strengthen and promote accessibility, enable collaboration, and motivate learners to engage actively in classroom activities (Soria et al., 2020). According to the findings of researches on WhatsApp for educational purposes, it has been shown to promote learning at anytime and anywhere, raise engagement and inspiration, provide teamwork, facilitate learning,

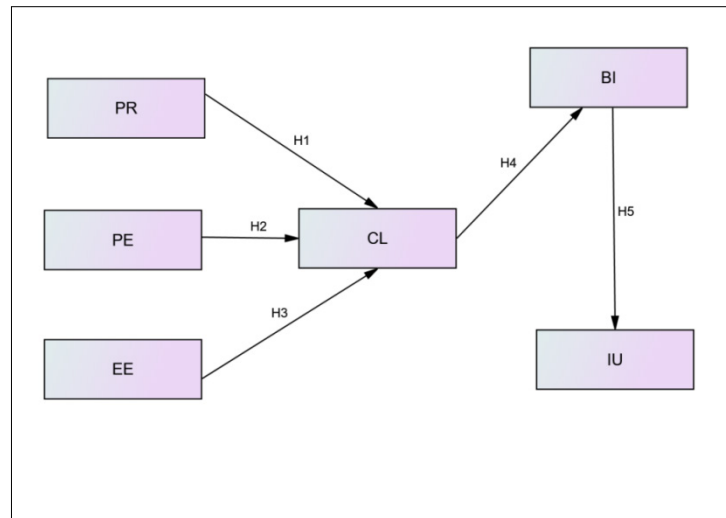
boost learner interaction and student-teacher interaction (Smit, 2012; Rambe & Chipunza, 2013; Plana et al., 2013; Church & De Oliveira, 2013; Jafari & Chalak, 2016; Rambe & Bere, 2013; Mistar & Embi, 2016; Güler, 2017).

Bui et al. (2021) provides the broadest definition of active collaborative learning, defining it as a situation in which two or more individuals study or seek to learn something new together. The core aspects of collaborative learning are interpersonal trust, individual responsibility, promotional engagement, interpersonal abilities, and group interaction (Lee & Yang, 2020). Collaborative learning with the use of technology has seen a lot of exposure in recent years. The ability to gather learners together using diverse platforms has created a lot of opportunities for events that take advantage of these technologies (James et al., 2022). Learning through social collaboration has been shown to improve students' academic performance and to reduce students' feelings of isolation by creating a more positive interactive online learning environment (Stöhr et al., 2020). With the advancement of online technology, educators are beginning to incorporate newer technological tools, in order to enhance more effective peer-to-peer/online synchronous/collaborative learning activities to ensure that students diligently acquire knowledge (Fischer & Yang, 2022).

Understanding the factors that promote student collaboration is critical to understanding how this approach to learning can be used more effectively in higher education online courses (Haugland et al., 2022). The research aims to establish a succinct conceptual model for evaluating the mediating role of collaborative learning in the acceptance of technology (WhatsApp) for second language acquisition (SLA).

The UTAUT Model

The Unified Theory of Acceptance & Use of Technology (UTAUT) analyses and integrates eight models of technology adoption, explaining users' behavioral intention towards the use of technology. The UTAUT includes TAM, theory of reasoned action, social cognitive theory, theory of planned behavior (TPB), motivational model, innovation diffusion theory, model of personal computer utilisation, and TAM and TPB combined (Botero et al., 2018). UTAUT initially aimed to explain the indicators affecting the adoption of employee information technology. Nevertheless, several researchers have applied it to the sense of education (Escobar-Rodríguez et al., 2013). The model is used to calculate the acceptance of blogs and wikis (Yueh *et al.*, 2015), Facebook (Escobar-Rodríguez et al., 2014), and podcasts (Avci & Askar, 2012). In the educational context, UTAUT is also used for assessing mobile learning (Abu-Ai-Aish & Love, 2013) and assess m-learning in emergent countries (Iqbal & Qureshi, 2012). In order to consider the intervention from an ethnographic standpoint, it is important to know whether or not people use the device and how they interact with the new technologies.

Figure 1*Conceptual Model*

As shown in figure 1, the conceptual model is based on the UTAUT model by Venkatesh et al. (2003). It has been modified to meet the purpose of the present study, and a new moderating variable namely, collaborative learning, was introduced into the model.

Perceived Relevance (PR)

PR is «the degree to which consumers perceive an object to be self-related or in some way instrumental to achieving their personal goals and values» (Celsi & Olson, 1988, p. 2011). It is the level to which one assumes that a method can help execute a job differently, quicker, and with precision, effectiveness, and reliability (Kaur et al., 2021). Perceived relevance has piqued the interest of researchers from a variety of technical areas (González-Ibáñez et al., 2016). Accordingly, these hypotheses were anticipated:

H1: PR has a direct affirmative effect on CL.

H1a: PR has an indirect and affirmative effect on BI.

H1b: PR has an indirect and affirmative effect on the IU.

Performance Expectancy (PE)

PE is the magnitude to which people think that using a certain device will help to improve their job outcome (Venkatesh et al., 2003). Perceived expectancy from TAM and TAM 2, motivational model's extrinsic incentive, job fit via the model of personal computer use, relative benefit from the innovation diffusion theory, and social cognitive theory's outcome expectation: all contributing to performance expectancy. Including the fact that a few studies have found no connection between behavioral intention and performance expectancy (Iqbal & Qureshi, 2012; Yueh et al., 2015; Acharya & Ganesan,

2019), many studies identify the significance of performance expectancy for assessment of technology for education (Martinho et al., 2018; Scherer et al., 2019). The strongest predictor of intention is performance expectancy (Alismaiel et al., 2022). Accordingly, these hypotheses were proposed:

H2: PE has a direct and affirmative effect on CL.

H2a: PE has an indirect and affirmative effect on BI.

H2b: PE has an indirect and affirmative effect on the IU.

Effort Expectancy (EE)

EE is the "degree of ease associated with the use of the system" (Botero et al., 2018, p. 5). According to Venkatesh et al. (2003), effort expectancy is important near the beginning stages of prolonged and continuous technology use, and becomes negligible over time. The initial technology acceptance model has this expanded definition of perceived user-friendliness. Rahmi & Birgoren (2020) believe EE is imperative in the milieu of digital learning, and its ease of use determines its acceptance. So, the anticipated hypotheses were:

H3: EE has a direct and affirmative effect on CL.

H3a: EE has an indirect and affirmative effect on BI.

H3b: EE has an indirect and affirmative effect on IU.

Collaborative Learning (CL)

CL consists of student partnerships that help complete learning activities (Zhampeissova et al., 2020). Students collaborate in groups of two or more, looking for under-

standing, answers, and definitions, or making products in a collaborative study (Yueh et al., 2015). Learning, according to Lave and Wenger (1994), is not only a single person's approach to acquiring experience but an interconnected practice that occurs within a group of people. Consequently, the following hypotheses were proposed:

H4: CL has a direct and affirmative effect on BI.

H4a: CL has an indirect and affirmative effect on IU.

Behavioral Intention (BI) & Intention to Use (IU)

This is a metric used to determine how strong a person's desire to carry out a specific action is (Dwivedi et al., 2019). Intention to use is the desire to perform a particular action (Bagozzi, 1981). Theoretically, BI has a substantial affirmative effect on technology use. This connection has been proven in studies involving a variety of educational technology. Therefore, the following hypotheses were proposed:

H5: BI has a direct and affirmative effect on IU.

METHOD

Participants

By using convenience sampling, the study sample comprises two hundred and two (N=202) undergraduate students studying in Institutes in Rajasthan, since college-going students make the maximum use of mobile phones. It is necessary to gauge their acceptance of technology for second language acquisition at this initial stage, in order to ensure better learning opportunities.

Instrument

The research instrument used for the survey is the questionnaire developed by the researcher. The questionnaire comprises two parts. Part A dealt with the demographic information such as student's age, gender, the field of study, etc. Part B comprised questions adopted from the modified UTAUT model. The UTAUT questions in Part B were subdivided into six subcategories. They were: effort expectancy, perceived relevance, performance expectancy, collaborative learning, behavioral intention, and intent to use. Responses were elicited from the respondents with the aid of a 5-point Likert scale.

Procedure

A pilot study included a sample of 30, in order to confirm that the instrument was consistent. Feedback was sought from the respondents, and any difficulties in interpretation of the items were removed. The respondents were informed

that there was no obligation, and there was no correct or incorrect answer to any of the questions. They were also conversant with the purpose of the study through the description of the Google form used for data collection.

Data was collected online through Google forms during February 2021. The SPSS application (IBM SPSS version 26) was utilised for data analysis. In order to empirically evaluate the proposed model, structural equation modeling was done via Smart-PLS (v.3.2.9). The reliability of data was confirmed through Cronbach's Alpha, AVE, and composite reliability. Discriminant validity was established through the Fornell Larker criterion (1981), cross-loadings, and Hensler criterion.

RESULTS

Demographics

The gender report of the students showed that the maximum number of participants were male undergraduates totaling 146 (72.3%), while female participants were 54 (26.7%). The analysis depicted that 160 (79.2%) of the total 202 participants were of the 18-20 age group. The remaining were above the age of 20. Among the participants, 189 (93.6%) were Bachelor of Technology students. The majority of the respondents totaling 130 (64.4%) claimed their daily mobile usage to be more than 4 hours a day, 26% of them marked it between 2 to 4 hours, and the remaining 10% reported it to be less than 2 hours a day.

Measurement Model

In the current study, PLS-SEM was performed in dual steps. In the first phase the measurement model was evaluated, and the structural model was assessed in the second step. A measurement model evaluates the competency of a scale used for research objectives as depicted in table 1. Cronbach's alpha is the coefficient of internal consistency. It asserts that the instrument's components pertaining to an aspect are internally coherent and can be utilised for the measurement of aspects. An α rating in the range of 0.6 to 0.7 denotes a sufficient level of reliability, whereas a value of 0.8 or larger indicates excellent reliability (Naveed et al., 2020). The values for the subscales ranged from 0.837 to 1.00, indicating that each variable had acceptable internal consistency. Composite reliability must exceed the usual benchmark of 0.70 as per Henseler et al. (2015); for the given constructs, it is above 0.8. AVE is equal to or greater than 0.50 for all constructs which meets the criteria given by Fornell and Larcker (2012). A VIF less than 10 suggests no multicollinearity, and that the expected regression model is accurate and meets the goodness-of-fit criteria (Deraman et al., 2019). Besides, another gauge, rho A (Dijkstra-Henseler's rho), establishes a precise estimate of data consistency.

Table 1
Reliability Measurements

Variable	Items	Variance Inflation Factor	Factor Loadings	Cronbach's alpha	rho_A	Composite Reliability	Average Variance Extracted
BI	BI2	2.075	0.81	0.837	0.842	0.839	0.723
	BI3	2.075	0.888				
CL	CL1	2.188	0.723	0.899	0.905	0.899	0.692
	CL2	2.884	0.827				
	CL3	2.791	0.891				
	CL4	2.611	0.876				
PE	PE1	2.118	0.725	0.9	0.904	0.9	0.643
	PE2	2.746	0.844				
	PE3	2.955	0.738				
	PE4	2.300	0.796				
	PE5	2.239	0.895				
EE	EE1	1	1	1	1	1	1
PR	PR2	1	1	1	1	1	1
IU	IU1	1	1	1	1	1	1

Note. BI=behavioral intention; CL=collaborative learning; EE=effort expectancy; IU=intention to use; PE=performance expectancy; PR=perceived relevance.

cy. Values greater than 0.7 are considered fit for the study (Ramírez & Palos-Sánchez, 2018). The convergent validity of the scale was verified because the results met the stipulated requirements.

As per the Fornell-Larcker criterion, the cross-loadings, and the Heterotrait-monotrait ratio, the discriminant validity is deliberated: (1) The AVE value, according to Fornell and Larcker (1981), must be higher than the correlation measurements of the variables. This criterion was met as the Fornell-Larcker test shown in table 2 depicted that when compared with the other values, the diagonal values are utmost for a definite construct (Naveed et al., 2020). (2) Next, cross-loadings were checked to ensure that each item loads maximum on its related construct. (3) As shown in table 3, HTMT below 0.80 confirmed the validity, as per the set criteria (Henseler et al., 2015). Hence, the scale was deemed reliable and valid for further study.

As observed in Table 4, a Standardised Root Mean Square Residual (SRMR) below 0.1 depicts a satisfactory fit. "This measures the difference between the observed correlation matrix and the correlation matrix implied by the model" (Ramírez & Palos-Sánchez, 2018, p. 13). An NFI value close to one is deemed suitable, and table 4 shows NFI of 0.88 (Botero et al., 2018). The endogenous underlying variables' coefficient of determination (R^2) is essential for interpreta-

tion. The R^2 was above 0.2 for CL which is considered moderate, while that for BI and IU was small to moderate (Ramírez & Palos-Sánchez, 2018). The Stone-Geisser test (Q^2) determined that the model was predictive as Q^2 was above 0, confirming that the model's endogenous components have a good extrapolative significance (Geisser, 1974).

The authors employed bootstrapping on 5000 samples using Smart-PLS ver.3.2.9, in order to assess the direct and mediation effects. The bootstrapping protocol is a non-parametric inferential procedure which randomly selects many subsamples (for example, 5,000) from the initial data set and replaces them with new data. It is essential to gather data on the population distribution, which will serve as the foundation for hypothesis testing. Bootstrapping technique is used for drawing conjectures about indirect effects, even when the mediators in the model are complicated (Preacher & Hayes, 2008).

Structural Model

The relationships amongst the constructs were estimated using structural equation modeling. It offers precise estimates of these error variance dimensions, in contrast to standard multivariate methods, incapable of measuring or

Table 2*Fornell-Larcker Discriminant Validity*

Variable	BI	CL	EE	IU	PE	PR
BI	0.85					
CL	0.429	0.832				
EE	0.356	0.554	1			
IU	0.370	0.232	0.087	1		
PE	0.366	0.622	0.655	0.107	0.802	
PR	0.331	0.352	0.165	0.167	0.197	1

Note. BI= behavioral intention; CL=collaborative learning; EE= effort expectancy; IU= intention to use; PE= performance expectancy; PR= perceived relevance.

Table 3*HTMT*

Variable	BI	CL	EE	IU	PE	PR
BI						
CL	0.431					
EE	0.355	0.552				
IU	0.372	0.237	0.087			
PE	0.364	0.618	0.654	0.105		
PR	0.332	0.351	0.165	0.167	0.194	

Note. BI= behavioral intention; CL=collaborative learning; EE= effort expectancy; IU= intention to use; PE= performance expectancy; PR= perceived relevance.

Table 4*Model Fit*

	Saturated Model	Estimated Model	
SRMR	0.039	0.054	
NFI	0.896	0.887	
	R Square	R Square Adjusted	Q ² (=1-SSE/SSO)
BI	0.184	0.180	0.110
CL	0.475	0.467	0.305
IU	0.137	0.133	0.112

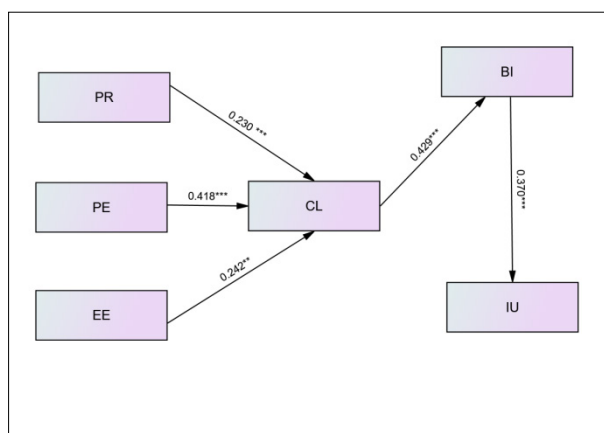
Note. BI=behavioral intention; CL=collaborative learning; IU=intention to use.

accounting for error. In this analysis, direct and indirect effects were calculated. Figure 2 displays the research model.

The study included the dependent variable, IU; the mediating variable, CL; and the three previously mentioned independent variables: PE, PR, and EE. The outcomes of direct, indirect, and total effects are clearly shown in Table 5. Let us suppose the value of t is between -1.96 and +1.96, the relationship between factors is negligible at a 95% confidence level, and if $t > 1.96$ and $p < 0.05$, the relationship between factors is significant at a confidence level of 95%.

The significance of all hypothesis paths in the research model was assessed. Therefore, none of them were dropped. The results prove that PR ($\beta=0.230$, p -value=0.000), PE ($\beta=0.418$, p -value=0.000), EE ($\beta=0.242$, p -value=0.007) were positively and significantly associated with CL. Hence H1, H2, and H3 were accepted. CL had a direct and considerable impact on BI ($\beta=0.429$, $p=0.000$) to use WhatsApp for language acquisition, supporting H4. This implies that CL partially mediated the effects of PR, EE, and PE. As H5 states, BI directly impacted IU positively ($\beta=0.370$, p -value=0.000). Therefore, the hypothesis was accepted.

Figure 2
Research Model



CL was found to play a momentous part in the adoption of TELL. The indirect relationships of PR ($\beta=0.099$, $p=0.005$), PE ($\beta=0.180$, $p=0.001$), and EE ($\beta=0.104$, $p=0.028$) were considerably affirmative with BI, implying that H1a, H2a, and H3a were accepted. The indirect relationships between PR ($\beta=0.037$, $p=0.019$), PE ($\beta=0.066$, $p=0.008$), and EE ($\beta=0.038$, $p=0.042$) with IU were also significant, which confirms H1b, H2b, and H3b.

All the indirect effects were substantial, but their effects were less significant than direct ones. Therefore, they were considered as partially mediated (Kale *et al.*, 2019). This shows that the mediating role of collaborative learning enhanced the user intention to use technology for SLA. Table 5 explicitly reveals that PR, PE, and EE influence CL. At the same time, CL has a substantial direct effect on BI and the most decisive indirect impact on IU.

DISCUSSION

The aim of the study was to examine the impact of the identified factors on the intent to use WhatsApp for SLA, emphasising the mediating role of collaborative learning. The researchers proposed an adapted model of exploring IT acceptance and use amongst students. The researchers hypothesised the exogenous variables which influence CL in the theoretical model. This is supported by the results. According to López-Nicolás *et al.* (2008), PR is an essential aspect in shaping individuals' IT acceptability. Likewise, the current study also asserted that PR had a positive and considerable, direct consequence on collaborative learning. This implies that an individual's desire towards adopting technology for collaborative learning is shaped by its academic relevance. As for its significance in technology acceptance, it has caught the attention of many researchers over the years like González-Ibáñez *et al.* (2016). Thus, the present study indicated that WhatsApp is a useful tool for students, something which could supplement their language learning needs.

As determined in the prior study by Venkatesh *et al.* (2003), the finest determinant of intention is PE, and in the present study, it had a strong and affirmative effect on CL; although a few studies suggest otherwise (Iqbal & Qureshi, 2012; Yueh *et al.*, 2015; Acharya & Ganesan, 2019). This is perhaps not surprising since an essential factor in determining students' behavior is the extent to which technology can be beneficial in educational settings (Lin *et al.*, 2013; Tan, 2013; Martinho *et al.*, 2018; Scherer *et al.*, 2019). Similarly, EE also had a considerably affirmative impact on CL which is similar to the findings of Wang *et al.* (2009) and Botero *et al.* (2018). It was found that students were drawn towards tools that are easy to handle, yet informative and time-saving (Rahmi & Birgoren, 2020). The easier the device, the more likely they are to utilise it for regular academic purposes.

Collaborative learning, according to Zhampeissova *et al.* (2020), promotes student partnerships which help complete learning activities. Therefore, it is an essential construct in SLA. Social networking tools help enhance collaborative tasks (Heflin *et al.*, 2017). WhatsApp notably has become a commonly used platform by young people, promoting accessibility and encouraging collaborative activities (Mistar & Embi, 2016; Güler, 2017; Soria *et al.*, 2020). Hence, it is believed that CL will have a considerable direct impact on BI and will mediate the influence of PR, EE, and PE on BI. The current study notes that CL had a significantly affirmative impact on using WhatsApp for SLA, and it partially mediates the influence of the exogenous variables. PR, PE, and EE exert more substantial direct effects on CL than on BI. Therefore, the study validates and extends the research by Güler (2017), Gašević *et al.* (2019), and Soria *et al.* (2020).

Finally, it was anticipated that BI would have a substantial direct impact on IU. BI is a strong predictor of the desire to engage in a particular task (Dwivedi *et al.*, 2019). Therefore, it had a direct and considerably positive impact on users' intent to use WhatsApp for SLA. This means that students who have higher BI to use WhatsApp for SLA are positively influenced towards actually using it. This finding goes in line

Table 5*Direct, Indirect & Total Effects*

	Paths	β	Standard Deviation	T Statistics	P Values
DIRECT EFFECTS	BI → IU	0.370	0.073	5.075	0.000
	CL → BI	0.429	0.088	4.902	0.000
	EE → CL	0.242	0.090	2.695	0.007
	PE → CL	0.418	0.096	4.336	0.000
	PR → CL	0.230	0.064	3.616	0.000
	CL → IU	0.159	0.047	3.418	0.001
INDIRECT EFFECTS	EE → BI	0.104	0.047	2.194	0.028
	EE → IU	0.038	0.019	2.035	0.042
	PE → BI	0.180	0.055	3.283	0.001
	PE → IU	0.066	0.025	2.657	0.008
	PR → BI	0.099	0.036	2.778	0.005
	PR → IU	0.037	0.016	2.344	0.019
	BI → IU	0.370	0.073	5.075	0.000
	CL → BI	0.429	0.088	4.902	0.000
	CL → IU	0.159	0.047	3.418	0.001
TOTAL EFFECTS	EE → CL	0.242	0.090	2.695	0.007
	EE → IU	0.038	0.019	2.035	0.042
	PE → BI	0.180	0.055	3.283	0.001
	PE → CL	0.418	0.096	4.336	0.000
	PE → IU	0.066	0.025	2.657	0.008
	PR → BI	0.099	0.036	2.778	0.005
	PR → CL	0.230	0.064	3.616	0.000
	PR → IU	0.037	0.016	2.344	0.019

Note. BI=behavioral intention; CL=collaborative learning; EE=effort expectancy; IU=intention to use; PE=performance expectancy; PR=perceived relevance.

with the study of Dwivedi et al. (2019). The empirical testing signifies that collaborative learning as a mediating variable enhanced the intention to use WhatsApp for SLA.

The present study has both practical and theoretical ramifications for academicians, as well as researchers. The investigation uses suitable statements, in order to understand the use and acceptance of technology for SLA. This is very important, since as technology is easily available to everyone in the form of android devices. Based on our findings, the researchers propose CL as an essential part of TELL in future research. Furthermore, the current analysis established connections that were not present in the previous technology acceptance models. This is a consequence of introducing

a new construct (CL). These paths include PR → CL, EE → CL, PE → CL, CL → BI, and CL → IU. These offer new insights and maybe important considerations in IT acceptance and use among individuals.

The findings show that CL plays an essential role in determining students' behavioral intention towards TELL. Mainly, it had a significant effect on BI, which suggests that practitioners or curriculum designers may find it (CL) essential in influencing the behaviors and intention of students to adopt TELL. Since all technology attributes (PE, EE, and PR) have a significant effect on CL and BI, educationists should concentrate on improving the system's usefulness, its ease of utility, and the use of innovations relevant to their academic pur-

poses. The results of the study may assist in overcoming the existing problems and designing more robust pedagogical language learning practices through TELL.

CONCLUSION

Based on a systematic literature review, a theoretical model was developed. Hypothetically, three constructs were described to be the most contributory to enhancing university students' use of TELL: PR, PE, and EE, with the mediating role of CL to use WhatsApp for SLA. In order to empirically test the model, a study was conducted with 202 undergraduate students studying in institutes in Rajasthan, using the survey method. Empirical testing signifies that the mediator, collaborative learning, enhanced the user intention to use WhatsApp for second language acquisition. The indirect effects were positive yet less significant than the direct effects. If these aspects are taken into account, the successful integration of TELL in ELT classrooms could be facilitated. There are three limitations to this research. Firstly, the results of the survey cannot be generalised due to the sample size, location, sampling method, etc. Secondly, the study relied solely on student self-assessment, which can differ significantly as the nature of the respondents varies. Thirdly, the respondents are all internet users. So, the output of this study could be biased. The intention to adopt TELL may be superior when compared with non-users or occasional users of the internet. Therefore, future studies should involve the acceptance behavior of less active internet users and

compare them to internet users, in order to arrive at more precise conclusions. Future research could attend to the effects of some more new and emergent moderating variables to strengthen the variance described by the predictors, since there are differences in the research setting.

DECLARATION OF COMPETING INTEREST

None declared.

AUTHORS' CONTRIBUTION

Divya Jyot Kaur: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources; Software; Supervision; Validation; Visualization; Writing – original draft; Writing – review & editing.

Niraja Saraswat: Conceptualization; Data curation; Investigation; Methodology; Project administration; Resources; Supervision; Validation; Visualization; Writing – original draft; Writing – review & editing.

Irum Alvi: Data curation; Formal analysis; Investigation; Methodology; Project administration; Software; Validation; Visualization; Writing – review & editing; Writing – original draft; Writing – review & editing.

REFERENCES

- Abu-Al-Aish, A., & Love, S. (2013). Factors influencing students' acceptance of m-learning: An investigation in higher education. *International Review of Research in Open and Distance Learning*, 14(5), 82–107. <https://doi.org/10.19173/irrodl.v14i5.1631>
- Acharya, S., and Ganesan, P. (2019). Factors that affect students' intention and use of technology: An assessment of UTAUT2 in the context of YouTube video forwarding behaviour. *International Journal of Business and Emerging Markets*, 11, 348–367. <https://doi.org/10.1504/ijbem.2019.105231>
- Alismaiel, O. A., Cifuentes-Faura, J., & Al-Rahmi, W. M. (2022). Social media technologies used for education: An empirical study on TAM model during the COVID-19 pandemic. *Frontiers in Education*, 7. <https://doi.org/10.3389/educ.2022.882831>
- Avci, U., & Askar, P. (2012). The comparison of the opinions of the university students on the usage of blog and wiki for their courses. *Educational Technology and Society*, 15(2), 194–205.
- Bagozzi, R. P. (1981). Attitudes, intentions, and behavior: A test of some key hypotheses. *Journal of Personality and Social Psychology*, 41(4), 607–627. <https://doi.org/10.1037/0022-3514.41.4.607>
- Botero, G. G., Questier, F., Cincinnato, S., He, T., & Zhu, C. (2018). Acceptance and usage of mobile assisted language learning by higher education students. *Journal of Computing in Higher Education*, 30(3), 426–451. <https://doi.org/10.1007/s12528-018-9177-1>
- Bui, T. X. T., Ha, Y. N., Nguyen, T. B. U., Nguyen, V. U. T., & Ngo, T. C. T. (2021). A study on collaborative online learning among EFL students in van lang university (VLU). *AsiaCALL*. 12, 9–21.
- Celsi, R. L., & Olson, J. C. (1988). The role of involvement in attention and comprehension processes. *Journal of Consumer Research*, 15(2), 210. <https://doi.org/10.1086/209158>
- Cetinkaya, L., & Sutcu, S. S. (2019). Students' success in English vocabulary acquisition through multimedia annotations sent via whatsapp. *Turkish Online Journal of Distance Education*, 20(4), 85–98. <https://doi.org/10.17718/TOJDE.640517>

- Çetinkaya, L., & Sütçü, S. S. (2018). The effects of Facebook and WhatsApp on success in English vocabulary instruction. *Journal of Computer Assisted Learning*, 34(5), 504–514. <https://doi.org/10.1111/jcal.12255>
- Chen Hsieh, J. (2022). Multimodal digital storytelling presentations among middle-school learners of English as a foreign language: Emotions, grit and perceptions. *RELC Journal*, 500. <https://doi.org/10.1177/00336882221102233>
- Church, K., & De Oliveira, R. (2013). What's up with WhatsApp? Comparing mobile instant messaging behaviors with traditional SMS. *MobileHCI 2013 - Proceedings of the 15th International Conference on Human-Computer Interaction with Mobile Devices and Services* (352–361). Germany-Association for Computing Machinery. <https://doi.org/10.1145/2493190.2493225>
- Dashkina, A., Kobicheva, A., Lazovskaya, T., Tokareva, E., Tarkhov, D., & Guselnikova, I. (2022). Examining the effectiveness of computer-supported collaborative learning for language proficiency purposes. *Sustainability*, 14(10), 5908. <https://doi.org/10.3390/su14105908>
- Deraman, R., Wang, C., Yap, J. B. H., Li, H., & Mohd-Rahim, F. A. (2019). Developing internet online procurement frameworks for construction firms. *Future Internet*, 11(6), 1–22. <https://doi.org/10.3390/FI11060136>
- Divjak, B., Rienties, B., Iniesto, F., Vondra, P., & Žižak, M. (2022). Flipped classrooms in higher education during the COVID-19 pandemic: Findings and future research recommendations. *International Journal of Educational Technology in Higher Education*, 19(1). <https://doi.org/10.1186/s41239-021-00316-4>
- Dwivedi, Y. K., Rana, N. P., Jeyaraj, A., Clement, M., & Williams, M. D. (2019). Re-Examining the Unified Theory of Acceptance and Use of Technology (UTAUT): Towards a revised theoretical model. *Information Systems Frontiers*, 21(3), 719–734. <https://doi.org/10.1007/s10796-017-9774-y>
- Escobar-Rodríguez, T., Carvajal-Trujillo, E., & Monge-Lozano, P. (2014). Factors that drive students to use facebook as a learning tool. An extension of the UTAUT. *IX Jornada De Docencia En Contabilidad Buenas Practicas Docentes En Materia Contable Dentro Del Eees* (pp. 135–152). Copicentro S. L.
- Escobar-Rodríguez, T., Carvajal-Trujillo, E., & Monge-Lozano, P. (2014). Factors that influence the perceived advantages and relevance of Facebook as a learning tool: An extension of the UTAUT. *Australasian Journal of Educational Technology*, 30(2), 136–151. <https://doi.org/10.14742/ajet.585>
- Fischer, I. D., & Yang, J. C. (2022). Flipping the flipped class: using online collaboration to enhance EFL students' oral learning skills. *International Journal of Educational Technology in Higher Education*, 19(1). <https://doi.org/10.1186/s41239-022-00320-2>
- Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/10.2307/3151312>
- Fouz-González, J. (2017). Pronunciation instruction through Twitter: The case of commonly mispronounced words. *Computer Assisted Language Learning*, 30(7), 631–663. <https://doi.org/10.1080/09588221.2017.1340309>
- Geisser, S. (1974). A predictive approach to the random effect model. *Biometrika*, 61(1), 101–107. <https://doi.org/10.2307/2334290>
- González-Ibáñez, R., Escobar-Macaya, M., & Manriquez, M. (2016). Using low-cost electroencephalography (EEG) sensor to identify perceived relevance on web search. *Proceedings of the Association for Information Science and Technology*, 53(1), 1–5. <https://doi.org/10.1002/pras.2016.14505301146>
- Güler, Ç. (2017). Use of WhatsApp in higher education: What's up with assessing peers anonymously? *Journal of Educational Computing Research*, 55(2), 272–289. <https://doi.org/10.1177/0735633116667359>
- Haugland, M. J., Rosenberg, I., & Aasekjær, K. (2022). Collaborative learning in small groups in an online course – A case study. *BMC Medical Education*, 22(1), 1–10. <https://doi.org/10.1186/s12909-022-03232-x>
- Heflin, H., Shewmaker, J., & Nguyen, J. (2017). Impact of mobile technology on student attitudes, engagement, and learning. *Computers and Education*, 107, 91–99. <https://doi.org/10.1016/j.compedu.2017.01.006>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- Herrera-Pavo, M. Á. (2021). Collaborative learning for virtual higher education. *Learning, Culture and Social Interaction*, 28, 100437. <https://doi.org/10.1016/j.lcsi.2020.100437>
- Iqbal, S., & Qureshi, I. A. (2012). M-learning adoption: A perspective from a developing country. *International Review of Research in Open and Distance Learning*, 13(3), 147–164. <https://doi.org/10.19173/irrodl.v13i3.1152>
- Jafari, S., & Chalak, A. (2016). The role of WhatsApp in teaching vocabulary to Iranian EFL learners at junior high school. *English Language Teaching*, 9(8), 85. <https://doi.org/10.5539/elt.v9n8p85>
- James, M., Baptista, A. M. T., Barnabas, D., Sadza, A., Smith, S., Usmani, O., & John, C. (2022). Collaborative case-based learning with programmatic team-based assessment: A novel methodology for developing advanced skills in early-years medical students. *BMC Medical Education*, 22(1), 1–12. <https://doi.org/10.1186/s12909-022-03111-5>

- Kale, E., Aknar, A., & Başar, Ö. (2019). Absorptive capacity and firm performance: The mediating role of strategic agility. *International Journal of Hospitality Management*, 78, 276–283. <https://doi.org/10.1016/j.ijhm.2018.09.010>
- Kaur, D. J., Saraswat, N., & Alvi, I. (2021). Exploring the effects of blended learning using WhatsApp on language learners' lexical competence. *Rupkatha Journal on Interdisciplinary Studies in Humanities*, 13(4), 1–17. <https://doi.org/10.21659/rupkatha.v13n4.60>
- Ko, E. G., & Lim, K. Y. (2022). Promoting English learning in secondary schools: Design-Based research to develop a mobile application for collaborative learning. *Asia-Pacific Education Researcher*, 31(3), 307–319. <https://doi.org/10.1007/s40299-021-00562-0>
- Lave, J., & Wenger, E. (1994). Situated learning: Legitimate peripheral participation. *American Ethnologist*, 21(4), 918–919. <https://doi.org/10.1525/ae.1994.21.4.02a00340>
- Lee, W. W. S., & Yang, M. (2020). Effective collaborative learning from Chinese students' perspective: A qualitative study in a teacher-training course. *Teaching in Higher Education*, 24, 1–17. <https://doi.org/10.1080/13562517.2020.1790517>
- Lin, S., Zimmer, J. C., & Lee, V. (2013). Podcasting acceptance on campus: The differing perspectives of teachers and students. *Computers and Education*, 68, 416–428. <https://doi.org/10.1016/j.compedu.2013.06.003>
- Martinho, D. S., Santos, E. M., Miguel, M. I., & Cordeiro, D. S. (2018). Factors that influence the adoption of postgraduate online courses. *International Journal of Emerging Technologies in Learning*, 13, 123–141. <https://doi.org/10.3991/ijet.v13i12.8864>
- Mellati, M., Khademi, M., & Abolhassani, M. (2018). Creative interaction in social networks: Multi-synchronous language learning environments. *Education and Information Technologies*, 23(5), 2053–2071. <https://doi.org/10.1007/s10639-018-9703-9>
- Miguel, E., & Carney, W. (2022). Foreign language acquisition anxiety and project-based learning in collaborative L2 instruction: A case study. *Theory and Practice in Language Studies*, 12(1), 1–6. <https://doi.org/10.17507/tpls.1201.01>
- Mistar, I., & Embi, M. A. (2016). Students' perception on the use of Whatsapp as a learning tool in ESL classroom. *Journal of Education and Social Sciences*, 4, 96–104.
- Mofareh, A. (2019). The use of technology in English language teaching. *Frontiers in Education Technology*, 2(3), 168. <https://doi.org/10.22158/fet.v2n3p168>
- Naveed, Q. N., Alam, M. M., & Tairan, N. (2020). Structural Equation Modeling for mobile learning acceptance by university students: An empirical study. *Sustainability*, 12(20), 8618. <https://doi.org/10.3390/su12208618>
- Pietarinen, T., Palonen, T., & Vauras, M. (2021). Guidance in computer-supported collaborative inquiry learning: Capturing aspects of affect and teacher support in science classrooms. *International Journal of Computer-Supported Collaborative Learning*, 1–27. <https://doi.org/10.1007/s11412-021-09347-5>
- Plana, M. G., Hopkins, J. E., Plana, M. G., & Appel, C. (2013). Improving learners' reading skills through instant short messages: A sample study using WhatsApp. *IV World CALL Conference on Global Perspectives on Computer-Assisted Language Learning* (pp. 10–13). WorldCALL.
- Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, 40(3), 879–891. <https://doi.org/10.3758/BRM.40.3.879>
- Rahmi, B. A. K. I., and Birgören, B. (2020). Analysis of the studies on e-learning acceptance of learners in the Middle East and the proposal of an extended technology acceptance model. *Kastamonu Eğitim Dergisi*, 28, 1977–1986. <https://doi.org/10.24106/kefedergi.4169>
- Rambe, P., & Bere, A. (2013). Using mobile instant messaging to leverage learner participation and transform pedagogy at a South African University of Technology. *British Journal of Educational Technology*, 44(4), 544–561. <https://doi.org/10.1111/bjjet.12057>
- Rambe, P., & Chipunza, C. (2013). Using mobile devices to leverage student access to collaboratively-generated resources: A case of WhatsApp instant messaging at a South African University. *International Conference on Advanced Information and Communication Technology for Education (ICAICTE)*. Atlantis Press. <https://doi.org/10.2991/icaicte.2013.66>
- Ramírez, R. R., & Palos-Sánchez, P. R. (2018). Environmental firms' better attitude towards nature in the context of corporate compliance. *Sustainability (Switzerland)*, 10(9). <https://doi.org/10.3390/su10093321>
- Scherer, R., Siddiq, F., and Tondeur, J. (2019). The technology acceptance model (TAM): a meta-analytic structural equation modeling approach to explaining teachers' adoption of digital technology in education. *Computers and Education*, 128, 13–35. <https://doi.org/10.1016/j.compedu.2018.09.009>
- Sharifi, M., Rostami AbuSaeedi, A. A., Jafarigohar, M., & Zandi, B. (2018). Retrospect and prospect of computer assisted English language learning: a meta-analysis of the empirical literature. *Computer Assisted Language Learning*, 31(4), 413–436. <https://doi.org/10.1080/09588221.2017.1412325>

- Sharma, A., & Alvi, I. (2021). Evaluating pre and post COVID 19 learning : An empirical study of learners ' perception in higher education. *Education and Information Technologies*. <https://doi.org/10.1007/s10639-021-10521-3>
- Sixto-García, J., & Duarte-Melo, A. (2020). Self-destructive content in university teaching: New challenge in the digital competence of educators. *Communication & Society*, 33(3), 187–199. <https://doi.org/10.15581/003.33.3.187-199>
- Soria, S., Gutiérrez-Colón, M., & Frumuselu, A. D. (2020). Feedback and mobile instant messaging: Using whatsapp as a feedback tool in EFL. *International Journal of Instruction*, 13(1), 797–812. <https://doi.org/10.29333/iji.2020.13151a>
- Stöhr, C., Demazière, C., & Adawi, T. (2020). The polarizing effect of the online flipped classroom. *Computers & Education*, 147, 103789. <https://doi.org/10.1016/j.compedu.2019.103789>
- Sun, Y., & Gao, F. (2019). An investigation of the influence of intrinsic motivation on students' intention to use mobile devices in language learning. *Educational Technology Research and Development*, 68(3), 1181–1198. <https://doi.org/10.1007/s11423-019-09733-9>
- Tan, P. J. B. (2013). Applying the UTAUT to understand factors affecting the use of English e-learning websites in Taiwan. *SAGE Open*, 3(4). <https://doi.org/10.1177/2158244013503837>
- Toyama, M., & Yamazaki, Y. (2021). Classroom interventions and foreign language anxiety: A systematic review with narrative approach. *Frontiers in Psychology*, 12(80), 13-25. <https://doi.org/10.1080/09588221.2018.1557692>
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly: Management Information Systems*, 27(3), 425–478. <https://doi.org/10.2307/30036540>
- Wang, Y. S., Wu, M. C., & Wang, H. Y. (2009). Investigating the determinants and age and gender differences in the acceptance of mobile learning. *British Journal of Educational Technology*, 40(1), 92–118. <https://doi.org/10.1111/j.1467-8535.2007.00809.x>
- Webb, M., & Doman, E. (2020). Impacts of flipped classrooms on learner attitudes towards technology-enhanced language learning. *Computer Assisted Language Learning*, 33(3), 240–274. <https://doi.org/10.1080/09588221.2018.1557692>
- Yueh, H. P., Huang, J. Y., & Chang, C. (2015). Exploring factors affecting students' continued Wiki use for individual and collaborative learning: An extended UTAUT perspective. *Australasian Journal of Educational Technology*, 31(1), 16–31. <https://doi.org/10.14742/ajet.170>
- Zhampeissova, K., Kosareva, I., & Borisova, U. (2020). Collaborative mobile learning with smartphones in higher education. *International Journal of Interactive Mobile Technologies (IJIM)*, 14(21), 4. <https://doi.org/10.3991/ijim.v14i21.18461>
- Zhang, R., Zou, D., Cheng, G., & Xie, H. (2022). Implementing technology-enhanced collaborative writing in second and foreign language learning: A review of practices, technology and challenges. *Education and Information Technologies*, 27, 8041-8069. <https://doi.org/10.1007/s10639-022-10941-9>