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Research Article

Mobile Assisted Language Learning: Ecuadorian Undergraduate Polytechnic Students' Perceptions

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Abstract: Despite the increased use of mobile devices for language learning, little research has examined Ecuadorian university students' perceptions of Mobile-Assisted Language Learning (MALL). This study aims to explore undergraduate polytechnic students' perceptions of using MALL for English skills development. Also, it looks at the different factors associated with the acceptance of technology and identifies those that are more common. This quantitative research design uses a survey adapted from the Technology Adoption Model (TAM). It counts with the participation of 126 Ecuadorian undergraduate polytechnic students taking English as a foreign language classes. Participants were very positive about using MALL applications to learn English during their off-classroom time. The average total mean score was 4.373. It was also determined, through multiple regression analysis, that Perceived Usefulness ($t = 6.025$, $p < 0.000$), Social Influence ($t = 2.876$, $p < 0.000$), and Perceived Outcomes ($t = 3.903$, $p < 0.000$) were the highest predictors of MALL acceptance. The two main contributions of this study to the literature are that students feel a connection between their language learning aims and attaining them by using MALL. Perceived Outcome is a high predictor of MALL usage. The findings suggest that Ecuadorian educational practices should increasingly integrate Mobile-Assisted Language Learning (MALL) technologies, as students perceive them as highly useful, especially in improving language skills, fostering social collaboration, and offering personalized, flexible learning experiences that align with their technological readiness and cultural context.

***Keywords*:** Mobile-Assisted Language Learning (MALL), Ecuadorian undergraduate polytechnic students, MALL acceptance predictors, students' perceptions, English as a foreign language

1. Introduction

1.1 *Overview of Mobile-Assisted Language Learning (MALL)*

Mobile-Assisted Language Learning (MALL) has represented a paradigm change in foreign language education. Chien et al. (2022) ascertain that MALL can harness the potential of mobile technologies to ease language acquisition and improve learning experiences (Jeong, 2022). MALL envelops smartphones, tablets, and other portable devices into language learning programs, allowing students ubiquitous access to resources (Lin et al., 2019), interactive applications (Keezhatta & Omar, 2019), and authentic communicative opportunities (Ma et al., 2019). This contemporary approach goes beyond the limitations of traditional language classroom settings, permitting students to engage with the foreign

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language anytime, anywhere (Çakmak, 2019).

MALL leverages the affordances of mobile devices to adapt to diverse learning styles and preferences, empowering students to personalize their language learning paths. MALL, at its core, has democratized access to language learning resources (Elaish et al., 2022), fostering inclusion (Shortt et al., 2021) and focusing on the diverse needs of learners across their proficiency levels and cultural backgrounds (De Vega et al., 2023). Moreover, the interactive nature of mobile applications provides opportunities for immersive practice, incorporating audio, video, gamified learning experiences, and real-time communication, thus enriching students' learning experiences.

Moreover, the advent of mobile-based learning applications, artificial intelligence-driven language tutoring, and augmented reality platforms has shifted language education, offering adaptive, personalized, and contextually relevant learning experiences (Lai et al., 2022). Integrating mobile technology into language learning environments has expanded the supply of resources and cultivated a system that transcends geographical and temporal boundaries, fostering global linguistic and cultural exchanges (García-Gómez, 2020).

In essence, MALL champions the confluence of technological advancement and pedagogical innovation, addressing a new era in language education characterized by the flexibility, interactivity, and inclusivity it offers students.

1.2 *Significance of the study*

The swift transformation of student learning habits, encouraged by the widespread use of mobile phones, requires research to understand better students' feelings toward using MALL. This study aims to bridge the gap between the evolving language learning environment and mobile technology integration. It addresses the need to understand how students feel about using MALL in their acquisition process. Moreover, the mixed-methods research design proposed reflects the holistic approach adopted to understanding the nature of learners' perceptions of MALL. This study offers practical implications for educators, informing pedagogical practices, curriculum design, and integrating mobile technology into language learning environments. Thus, it contributes to the ongoing discourse on the efficacy of MALL.

Moreover, after an exhaustive search of the literature, it was found that studies originated in different parts of the globe, but none were originally from Ecuador. Ecuador presents a distinct socio-cultural and educational context compared to regions previously studied in MALL. The country's relatively recent incorporation of technology in education creates a unique environment for understanding students' perceptions. Investigating how Ecuadorian undergraduate polytechnic students engage with mobile learning technologies offers insights into their specific challenges, resources, and strategies, which may differ from those in countries with more established technological infrastructure. Moreover, existing MALL research predominantly stems from developed nations or specific cultural contexts, often reflecting their technological landscapes and educational paradigms. This study contributes to diversifying the theoretical frameworks within MALL literature by focusing on Ecuador. It provides an opportunity to explore how local factors-such as technology accessibility, pedagogical approaches, and cultural attitudes towards speaking foreign languages-shape students' experiences and perceptions, thus enriching the understanding of MALL in under-researched contexts. As there is a scarcity of empirical studies focusing on MALL within Ecuador, this research generates foundational data that can pave the way for future investigations. It fills a critical void in the literature, allowing subsequent researchers to build upon the findings and conduct comparative studies within Latin America and beyond, enhancing the generalizability of MALL theories.

1.3 *Research questions*

The following questions have been posed to serve as the guiding light for this research:

RQ1: How do Ecuadorian undergraduate polytechnic students perceive the usefulness of MALL in facilitating language practice?

RQ2: What are the main predictive factors of Ecuadorian undergraduate polytechnic students' acceptance of integrating MALL into their language learning practices?

2. Literature review

2.1 *Theoretical foundations of MALL*

2.1.1 *Vygotsky's sociocultural theory and its application to MALL*

Lev Vygotsky's sociocultural theory is a foundational framework in developmental psychology and education, emphasizing the pivotal role of social interaction, cultural context, and language in shaping cognitive development (Turuk, 2008). Vygotsky introduced the Zone of Proximal Development (ZPD), highlighting the space between what a learner can do independently and what can be achieved with guidance (Margolis, 2020). Scaffolding involves providing tailored support to learners within their ZPD. Vygotsky argued that learning is a social process, asserting that cultural tools, particularly language, play a central role in mediating cognitive functions (Wilder & Lillvist, 2021). His theory underscores the significance of collaborative and culturally situated learning experiences.

Applying Vygotsky's sociocultural theory to MALL enriches language acquisition by influencing social interaction and cultural context through mobile devices. Shortt et al. (2021) explain that MALL provides a platform for collaborative learning, connecting learners to authentic language communities and facilitating real-time communication, aligning with Vygotsky's emphasis on social engagement (Aliakbari & Mardani, 2022). The Zone of Proximal Development (ZPD) is seamlessly integrated into MALL, tailoring language tasks to individual proficiency levels and offering scaffolded support (Liu & Moeller, 2019). Mobile technologies act as cultural tools, mediating language learning experiences and providing a dynamic, socially situated environment that aligns with the principles of Vygotsky's sociocultural theory.

2.1.2 *Constructivism and its integration into MALL*

Constructivism focuses on active engagement, meaning-making, and learner autonomy (Almusharraf, 2020). According to constructivism, learners are seen as active participants who construct knowledge by interacting with their environment and peers (Abuzandah, 2020). Constructivist principles emphasize real-world language, thus promoting meaningful communication and problem-solving (Magaji, 2021). Learners' prior knowledge is crucial as it fosters a personalized and dynamic language learning process, empowering students to be independent thinkers and communicators.

Integrating constructivism into MALL makes language learning an active and participatory process. When MALL is aligned with constructivist principles, it emphasizes learner engagement (De Vega et al., 2023), autonomy (Sato et al., 2015), and the creation of meaning (Luo & Watts, 2022). Thus, when learners are guided by their prior experiences, they can actively engage with authentic language resources, making their learning path more personalized. Therefore, integrating constructivism into MALL can enhance language proficiency (Mortazavi et al., 2021) and cultivate critical thinking skills (Agustina et al., 2022). Therefore, MALL teachers can ensure a more holistic and practical language learning experience.

2.1.3 *Task-based language teaching and its incorporation into MALL*

The core principles of Tas-based Language Teaching (TBLT) center on meaningful communication and practical language use (Bhandari, 2020; Zhou & Deocampo, 2023). Learners exposed to TBLT engage in authentic, real-world tasks that require using language skills to complete. Communication is prioritized by TBLT over form, emphasizing fluency and functional language (Zhou & Deocampo, 2023). Tasks allow students to solve problems (Nychkalo et al., 2020), make decisions (Xu et al., 2019), and attain goals using the target language. Furthermore, Belda-Medina (2021) explains that TBLT aligns with communicative language teaching methods, focusing on developing communicative competence.

Since MALL facilitates incorporating authentic, real-world tasks, it can engage learners with contextually relevant and interactive language content. Students can access resources, collaborate with peers, and complete communicative tasks using their mobile devices. Thus, MALL fosters the application of language skills in practical settings (Chuah & Kabilan, 2022). Integrating TBLT into MALL promotes language proficiency, learner autonomy, motivation, and engagement, thus enriching the learning experience.

2.1.4 *The technology acceptance model (TAM)*

The Technology Acceptance Model (TAM) is widely used to study user adoption of new technologies, including e-learning platforms like Moodle (Al-Adwan, 2020). This model postulates that individuals' attitudes towards technology, specifically their perceived usefulness and ease of use, are the primary determinants of their intention to use that technology. TAM has proven valuable in understanding the factors influencing technology adoption across various domains, from business to education (Tahar et al., 2020).

At the core of TAM are six key constructs that interact to shape individuals' technology adoption behavior (Al-Rahmi et al., 2019). Perceived usefulness refers to the belief that technology will improve an individual's job performance or task effectiveness. On the other hand, perceived ease of use is the belief that using a technology will be free from effort. These two constructs influence individuals' attitudes toward technology use (Huang et al., 2017). Attitude, in turn, represents the individual's positive or negative feelings about using technology. The intention to use, a behavioral intention, is the individual's likelihood of adopting and using the technology. Social influence, a subjective norm, captures the perceived social pressure to use or not use technology. Finally, facilitating conditions refer to the available resources and support necessary for technology use.

TAM has been widely applied in foreign language teaching to understand learners' and teachers' attitudes towards technology integration. Studies have explored TAM in various contexts, including virtual reality for Chinese language education (Barrett et al., 2020), Zoom for online language learning during COVID-19 (Alfadda & Mahdi, 2021), and ICT use in English language learning (Sulistiyo et al., 2022). Research has shown positive correlations between TAM variables, such as perceived usefulness, perceived ease of use, and behavioral intention (Tahar et al., 2020). Factors like digital literacy self-efficacy, motivation, and ICT skills have been found to influence technology acceptance. Gender does not appear to correlate with TAM variables, while experience does (Al-Adwan, 2020). These findings highlight the importance of considering various factors when implementing technology in language teaching and emphasize the need to develop digital literacy skills among learners and teachers.

2.2 *The evolution of mobile devices in language learning*

Mobile devices have undergone a remarkable transformation in language learning, with significant developments shaping the landscape of mobile learning. In its early stages, mobile devices were restricted to vocabulary and flashcard apps (Agustina et al., 2022). Students faced technological limitations as mobile devices offered rudimentary exercises and lacked interactivity. Nonetheless, it was the groundwork necessary to recognize the potential of mobile technology in augmenting language education.

Technological improvements have played a significant role in the revolution of MALL. The propagation of smartphones and tablets equipped with enhanced processors, larger screens, and complex functionalities has expanded the possibilities of language-learning use (Jung, 2020). Nowadays, students can have a more dynamic language learning experience with immersive simulations (Liu et al., 2020), interactive multimedia (Juniardi et al., 2020), and augmented reality applications (Zhang et al., 2020). Mobile devices have transcended their initial role as mere information repositories to become versatile tools for communication and collaboration.

Furthermore, artificial intelligence and natural language processing have elevated the capabilities of MALL apps, explained Karakaya and Bozkurt (2022). Language instruction has become tailored and effective through adaptive learning algorithms, personalized feedback mechanisms, and intelligent tutoring systems (Ramzan et al., 2023). Learners can engage in authentic conversations with AI-driven chatbots, receive instant feedback on pronunciation, and access adaptive content that aligns with their proficiency levels (Chuah & Kabilan, 2021). The onset of ubiquitous internet connectivity has also favored MALL. Cloud-based platforms let students access resources, collaborative activities, and real-time updates (Zubani et al., 2022). Students participate in virtual classrooms, join language exchange communities, and easily access authentic cultural content.

2.3 *The effectiveness of MALL*

Research has proven that MALL is an effective tool for learning English. Learners taught using MALL have demonstrated that they are energized, positive, and eager to use mobile devices in their education inside and outside

the classroom (Botero et al., 2022). Several researchers have reported that learners have positive sentiments about integrating mobile apps into their learning process (Kener, 2018; Bieńkowska et al., 2021; Arini et al., 2022; Thuong & My, 2023). In line with this report, Lin and Lin (2019) discovered that after students had completed the activities assigned using mobile phones, they admitted to regard smartphones as beneficial for language learning. Furthermore, Kessler (2021) also explained that learners get engaged with the language-learning apps on their smartphones.

MALL has also been proven effective in improving language skills. According to Li (2023), the effect size of using MALL for developing listening skills was moderate to large, which suggests the effectiveness of using mobile devices over traditional methods. Similarly, Thuong and My (2023) identified statistically significant differences between the control and experimental groups, favoring the experimental group. Results depicted improvements in listening skills, especially in highly motivated students.

MALL can also aid learners in developing their speaking skills. Research has revealed that students are usually satisfied with using mobile devices to practice speaking. Moreover, students who practice speaking using mobile devices outperform those who do not (Aliakbari & Mardani, 2022). Furthermore, those students who used mobile-based classes had a significant increase in motivation to participate in class discussions. Also, the literature reports that using mobile phones encourages students' motivation to participate in speaking activities as they are used enthusiastically by learners who respond well to their use (Juniardi et al., 2020).

Reading is also a skill that has been positively affected by using MALL. It can be claimed that MALL-based reading activities have several advantages in terms of accessibility, usability, and functionality, say Keezhatta and Omar (2019). The authors claim MALL reading activities to be motivating, entertaining, and stimulating. Thus, learners have a positive attitude toward MALL, improving their learning process. Finally, Lin et al. (2019) reviewed several studies. They concluded that MALL the effectiveness of MALL tools in developing reading comprehension is shown in increased reading competence, increased frequency and amount of reading, shared annotations, greater attention, and better decoding skills.

Different studies have also examined the development of writing skills. Results suggest that while learners engage in the writing process utilizing MALL-based applications inside and outside the classroom, their learner autonomy is improved (Al-Shehab, 2020). Furthermore, implementing MALL in the writing instruction process also suggests increased motivation and peer collaboration (Liaqat et al., 2020). It has also been reported that mobile-assisted task-based learning significantly and positively affects students' writing competency, increasing their motivation.

2.4 *Previous studies on students' perceptions of MALL*

Nuraeni et al. (2020) conducted quantitative research on 70 English majors at an Indonesian university. According to their results, participants positively perceived using mobile phones. They found it effective for pronunciation and the overall development of their English skills. The researchers also reported problems with internet connection, being redirected to different contents, and familiarity with using mobile devices to learn the language as detriments of using MALL. However, two limitations attracted the attention of the researcher. First, the number of questionnaires distributed does not seem adequate, making it difficult to generalize the findings. Moreover, the answers provided by the participants may not accurately reflect the real situation, potentially leading to biased results. While the study provides valuable insights, further research with a larger and more representative sample may be necessary to validate the findings and address the identified issues.

In a mixed-method explanatory sequential design, Wang and Hsu (2020) surveyed one hundred Taiwanese students using the Technology Acceptance Model (TAM). Additionally, thirteen participants were later interviewed. The researchers concluded that most students had positive perceptions of using mobile devices in language learning. Students felt that MALL was beneficial for practicing pronunciation. Nonetheless, several limitations can be mentioned. First, the sample size was limited, restricting the generalization of results. Second, the research solely utilized the Technology Acceptance Model (TAM), suggesting that a multi-faceted approach could provide richer insights into user perceptions. Finally, the absence of a control group limits the ability to compare traditional learning methods with MALL and assess differences in learning outcomes.

Bhestari and Luthfiyyah (2021) performed case study design research and followed four Indonesian university students. The researchers used interviews and self-reflection as data collection tools. They concluded that students have a positive perception of using MALL. Participants claimed that the two main factors for their acceptance of MALL are

ease of use and perceived usefulness. Furthermore, the authors relate that students' perception of using MALL is good and helps learners implement autonomous learning. Notwithstanding the above, the study's limitations include that it primarily reflects the students' perspectives on Mobile Assisted Language Learning (MALL) without considering teachers' roles in its implementation. Additionally, the findings may not be generalizable beyond the specific group of EFL students at a private university. Future research could explore how teachers integrate MALL into autonomous learning practices.

In a paper by Shadiev et al. (2021), the affordances and student perceptions of MALL in familiar environments were examined. Twenty-five Chinese students of English as a foreign language participated in the study. Students used a platform installed on a tablet. The scholars used a questionnaire based on TAM. This survey demonstrated that students highly valued the platform they used and were satisfied with their learning. Some limitations stem from this study. First, the sample of 25 participants, while providing some insights, is not representative of the entire Chinese EFL student of Chinese EFL students population. Second, the results might not be directly applicable to students from other cultural backgrounds or language contexts. Cultural factors can significantly influence technology adoption and learning experiences. Third, the study was conducted using a specific tablet-based MALL platform. The results might not be applicable to other MALL tools or platforms with different features or interfaces.

In an article by Aratusa et al. (2022), the author examined students' perceptions of using MALL in pronunciation practice. This mixed-method research design used the explanatory sequential method for data analysis. According to students' perceptions, the scholar concluded that MALL is a valuable tool in the learning process; they also believed that using mobile applications to learn pronunciation was positive as it enhances their skills. Finally, this study contains several limitations. First, the respondents in this study were only fifteen students. Second, the response rate of the questionnaires was about 66%. This non-response bias can lead to skewed results, as those who did respond may have different characteristics or opinions than those who did not.

3. Methodology

This study follows a quantitative research design using a five-point Likert scale survey to obtain students' perceptions of MALL.

3.1 *Participants*

The researcher secured the participation of 126 Ecuadorian undergraduate students who had registered in the last English subject they had to take in the university and were assigned to the teacher-researcher. Convenience sampling, a non-probability sampling strategy, was used to choose the study participants. This strategy entails selecting people who are willing and able to participate (Andrade, 2020). The participants' demographic data are included in Table 1.

Table 1. Participants' demographic data

Demographics	Categories	N = 126	%
Gender	Male	77	61
	Female	49	39
Age	20-22	91	72.2
	23-25	28	22.2
	26 and up	7	5.6
City of origin	Guayaquil	91	72.2
	Duran	21	16.6
	Santa Elena	14	11.1
Faculty	Electrical and Computer Engineering	21	16.6
	Social Sciences and Humanities	28	22.2
	Mechanical Engineering and Production Sciences	21	16.6
	Other engineering programs	56	44.4

3.2 *The survey*

The survey, adapted from Davis's (1989) Technology Acceptance Model (TAM), contained two sections. The first section collected demographic data from the participants, and the second collected students' perceptions. Not all the constructs from Davis's (1989) model were used in this study, and some of the items were re-worded, so they were all positive. Also, some of the items were not included in the final survey. It contained 31 5-point Likert scale statements where one equals completely disagree, and ive equals completely agree. The survey measured six constructs, "Perceived Ease of se" (PEOU), "Social Influence" (SI), "Perceived Usefulness" (PU), "Student's Motivation" (SM), "Students' Readiness" (SR), and "Perceived Outcome" (PO).

All ethical standards for research involving humans are followed in this work. Before the study began, all participants must read and sign the informed consent form. They were reassured that their privacy would be respected during the research and that their data would be securely maintained and anonymized. Respondents were also told they could leave the study at any time, and any possible negative impacts would be minimized.

3.3 *Reliability and validity of the survey*

Several measures were taken to ensure the reliability and validity of the survey. First, the survey was checked for internal consistency by calculating Cronbach's alpha. The alpha was calculated for the whole scale and each of the scale's constructs, reaching a coefficient of 0.917, which, according to Taber (2017), is a robust result. Thus, it can be understood that the survey used is reliable. Table 2 contains all Cronbach's results.

Table 2. Cronbach's alpha results

Whole scale	PEOU	SI	PU	SM	SR	PO
0.917	0.845	0.879	0.807	0.887	0.864	0.828

Then, the researcher calculated the survey's content validity following Yusoff's (2019) suggestions. The content validity check aims to ensure that the items included in the survey are relevant and comprehensive in measuring the intended construct. First, the content validation form was drafted. Then, the researcher obtained the help of six professors from the languages department who formed the panel of experts. These experts received the validation form via e-mail and a manual with clear instructions.

The six reviewers assessed the survey and provided their ratings for each item. The average proportion of items judged as relevant was found to be 0.96, which, according to Yusoff (2019), indicates a high level of agreement on the relevance of the survey items. The Scale's Content Validity Index average suggested that 96% of the content of the survey is considered relevant by the expert reviewers. The Scale's Content Validity Index Universal Agreement, the proportion of items on the scale that achieve a relevance scale of 3 or 4 by all experts, resulted in 0.94, indicating a high agreement level among the experts on the relevance of the survey items. Based on these findings, it can be concluded that the survey demonstrates a high level of content validity, and the survey items are relevant in measuring the intended construct.

The next validity check-up performed was to obtain the model's construct validity. An Exploratory Factor Analysis was performed to explore the data's underlying structure and achieve the survey's validity (Kang, 2013). The Principal Component Analysis and a Varimax Rotation method were used in the analysis. The KMO (Kaiser-Meyer-Olkin) value obtained was 0.602, which indicates that the data is moderately suitable for factor analysis, suggesting an interrelation among the variables. Meanwhile, Bartlett's sphericity test (Sig. < 0.001) indicates that the correlation matrix is not an identity matrix, and the variables are interrelated, making factor analysis appropriate. The total variance explained by the six factors identified is 62.42%, meaning that the factors account for a substantial portion of the variance in the data, suggesting that the factors are meaningful and interpretable. Finally, all Eigenvalues are above 0.5. Results are shown in Table 3.

Table 3. Factor analysis

Variables	Components						Constructs
	1	2	3	4	5	6	
PEOU1	0.700						Perceived Ease of Use
PEOU2	0.691						
PEOU3	0.653						
PEOU4	0.622						
SI1		0.742					Social Influence
SI2		0.689					
SI3		0.609					
SI4		0.576					

Table 3. (cont.)

Variables	Components						Constructs
	1	2	3	4	5	6	
PU1			0.749				Perceived Usefulness
PU2			0.602				
PU3			0.569				
PU4			0.545				
PU5			0.532				
SM1				0.793			Student Motivation
SM2				0.747			
SM3				0.631			
SM4				0.624			
SM5				0.505			
SR1					0.815		Student Readiness
SR2					0.799		
SR3					0.731		
SR4					0.658		
SR5					0.610		
SR6					0.565		
SR7					0.529		
PO1						0.819	Perceived Outcome
PO2						0.745	
PO3						0.701	
PO4						0.673	
PO5						0.633	
PO6						0.592	
Cronbach's α	0.845	0.879	0.807	0.887	0.864	0.828	
Eigenvalue	2.666	2.616	2.997	3.300	4.707	4.163	
Variance Explained (%)	29.94	8.43	7.35	6.40	5.24	5.09	

3.4 *The MALL intervention*

During the four-week intervention, the teacher-researcher introduced WhatsApp and Instagram, which participants had to use during their out-of-class study time. WhatsApp was used to practice students' writing skills for persuasive essays.

Through WhatsApp and Instagram, the teacher-researcher posted information on how to write the different sections of a persuasive essay, followed by different activities learners had to carry out during their cooperative learning time. They formed small groups, and each member presented an argument about a topic. Other members responded with counterarguments or supporting points. Thus, it promotes critical thinking and allows students to refine their ideas in real-time discussions (Cronje & Van Zyl, 2022). Also, the teacher-researcher sent persuasive essay prompts on WhatsApp, and students submitted short persuasive paragraphs responding to the prompts. These short, frequent exercises built fluency and helped students practice structuring persuasive arguments with clarity and focus (Ayan, 2020). Lastly, students exchanged drafts of their essays with their peers, who provided constructive feedback by pointing out areas for improvement. This encourages collaboration and helps students learn to analyze persuasive writing critically (Awada, 2016). The primary role of the teacher-researcher was to conduct the weekly classes, introduce the tools, assign the tasks, and help in the learning process.

4. Analysis

The researcher used SPSS V 20 software to analyze the gathered data. First, descriptive statistics were obtained to analyze students' perceptions of their use of MALL and help summarize and present the basic features of the data. Then, multiple linear regression was used to analyze simultaneously the impact of the six predictors on students' acceptance of MALL.

5. Results

5.1 *Descriptive statistics*

The first analysis was the descriptive statistics of the survey data gathered. Results are presented in Table 4.

Table 4 shows the descriptive statistics for each item and the constructs surveyed. The overall mean for the Perceived Ease of Use is 4.515, demonstrating that students agree with the variables of this construct. Meanwhile, the standard deviations of the items are relatively low, suggesting that the responses are consistent across the sample. All items' mean scores are relatively high, indicating that participants agree that the MALL is easy to use. Participants perceived that MALL is neither challenging nor frustrating as the highest item with M = 4.54/SD = 0.613. The second most common response was the statement referring to the little mental effort required to use the MALL applications; it obtained an M = 4.52/SD = 0.646.

The second construct was Social Influence (SI), which obtained an average M = 4.330. the mean scores for SI2, "MALL has enhanced possibility of working in teams" (M = 4.38/SD = 0.752) SI3, "Nobody forced me to use MALL outside the classroom" (M = 4.42/SD = 0.641), and SI4 "MALL is a good social networking and effective language learning tool" (M = 4.28/SD = 0.729) are relatively high, indicating respondents believe MALL allows them to interact with their peers. The standard deviations are relatively low, which suggests that responses are consistent across the sample.

The Perceived Usefulness construct obtained an overall M = 4.392, meaning participants expressed a high level of agreement. The three items with the highest mean scores are PU3, "I believe that MALL has increased my overall productivity and performance," which obtained the highest score (M = 4.52/SD = 0.707). PU2 follows this variable: "I felt that MALL provided me more control over my assignments and helped me with several linguistic concerns," which got an M = 4.48/SD = 0.706). The third highest mean score was for PU4, "MALL has helped me accomplish my assignments better," this item obtained a score of M = 4.42/SD = 0.758). All these relatively high mean scores indicate that respondents believe using MALL is helpful for their everyday language learning. Finally, the standard deviations are relatively low, suggesting that the responses are consistent across the sample.

Table 4. Descriptive statistics

Variables	N	Item Mean	Desv. típ.	Construct Mean	Meaning
PEOU1	126	4.50	0.646	4.515	Agree
PEOU2		4.54	0.613		
PEOU3		4.50	0.735		
PEOU4		4.52	0.646		
SI1		4.24	0.656	4.330	Agree
SI2		4.38	0.752		
SI3		4.42	0.641		
SI4		4.28	0.729		
PU1		4.34	0.688	4.392	Agree
PU2		4.48	0.706		
PU3		4.52	0.707		
PU4		4.42	0.758		
PU5		4.20	0.782		
SM1		4.33	0.678	4.280	Agree
SM2		4.18	0.800		
SM3		4.34	0.688		
SM4		4.24	0.770		
SM5		4.30	0.762		
SR1		4.18	0.800	4.311	Agree
SR2		4.22	0.736		
SR3		4.32	0.683		
SR4		4.36	0.721		
SR5		4.34	0.717		
SR6		4.34	0.745		
SR7		4.42	0.730		
PO1		4.36	0.776	4.410	Agree
PO2		4.48	0.677		
PO3		4.46	0.613		
PO4		4.42	0.674		
PO5		4.36	0.721		
PO6		4.40	0.670		

Regarding "Student Motivation," the fourth construct, learners generally agree that using the apps suggested by the teacher-researcher has motivated them to learn the language. The three highest mean scores are for SM3, "I want to continue using the application in my smartphone to learn English" (M = 4.34/SD = 0.688), SM1, "I highly favor the use of mobile applications in the language learning process" (M = 4.33/SD = 0.678), and SM5 "I keep on making an effort of using the mobile applications to learn English" (4.30/SD = 0.762). We can see that all mean scores are relatively high, meaning that participants agree they feel motivated using mobile applications. At the same time, the standard deviations are relatively low, which might suggest consistent responses across the sample.

The fifth factor, "Student Readiness," got an overall mean score of 4.311, meaning participants recognized they were ready to use mobile applications to learn English. The three items that stand out are SR4, "I would like to undertake enrichening learning activities using mobile devices" (M = 4.36/SD = 0.721), SR6, "I am ready to use my smartphone to improve my English learning" (M = 4.34/SD = 0.745), and SR5 "I don't mind using my smartphone as a learning tool" (M = 4.34/SD = 0.717). These items have relatively high mean scores, while the standard deviations are low, suggesting the responses are consistent across the sample.

The last factor, "Perceived Outcome," is the second most significant construct, with an overall mean score of 4.410, suggesting participants feel that MALL has helped them reach their proposed outcome of learning the language. The most important item is PO2, "I am ready to spend more using my mobile internet connection to improve my English" (M = 4.48/SD = 0.677). The second item with the highest mean score is PO3, "I have improved my English skills since I started using MALL" (M = 4.46/SD = 0.613), and the third variable is PO4, "I have saved time after adopting MALL applications" (M = 4.42/SD = 0.674). These mean scores are relatively high, meaning participants agree that using MALL has had positive results. Lastly, the standard deviations are relatively low, suggesting that the responses are consistent across the sample.

5.2 *Multiple linear regression*

The second analysis performed was a multiple linear regression. Uyanık and Güler (2013) explain that this type of analysis is useful for simultaneously determining the impact of several predictors on a dependent variable. The regression results are shown in Table 5.

Table 5. Multiple Regressions Analysis

Construct	Beta	R^2	F	t-value	p-value	Predictor
PEOU	0.764	0.583	67.12	8.13	0.000	No
SI	0.793	0.629	81.48	9.03	0.000	Yes
PU	0.783	0.614	76.27	8.73	0.000	Yes
SM	0.663	0.429	37.74	6.14	0.000	No
SR	0.774	0.591	71.75	8.47	0.000	No
PO	0.837	0.694	92.25	10.59	0.000	Yes

The results of the multiple linear regression indicated that there was a robust collective significance effect between the constructs and students' acceptance of MALL ($F(3.96) = 54.36$, $p < 0.001$, $R2 = 0.63$, $R2adj = 0.62$). Additionally, the individual predictors were examined, and results suggested that PO ($t = 3.903$, $p < 0.000$), SI ($t = 2.876$, $p < 0.000$), and PU ($t = 6.025$, $p < 0.000$) were significant predictors in the model. When analyzing the relationship between the independent and dependent variables, R2 equals 0.629, which means that the predictors (Xi) explain 62.9% of the

variance of Y. The coefficient of multiple correlations (R) equals 0.793, meaning a strong correlation exists between the predicted data (ŷ) and the observed data (y). The goodness of fit of the overall regression was also computed, with a right-tailed F(3.96) = 54.363, p-value < 0. Since p-value < α (0.05), it is suggested to reject the H_0.

The above calculations were further validated with a series of additional tests. The residual normality of the model was assessed using Shapiro-Wilk's test. The p-value equals 3.69e-10. Therefore, it can be assumed that the data is not normally distributed. Also, the dataset was run through White's test for homoscedasticity. The test outcome is highly significant, with a p-value of 0.0000209, and the computed F-statistics is 12.064. Thus, there is strong evidence to reject the null hypothesis of homoscedasticity. Then, the calculations were tested with an A Priori Power Analysis. The pre-study computation yields a power of 0.9092, which is considered strong. This high level of power suggests the study is well-equipped to identify a significant effect of the predictors on the outcome variable if one exists.

6. Discussion

This study aimed to explore Ecuadorian undergraduate polytechnic students' perceptions of Mobile-Assisted Language Learning (MALL) as a tool for improving their foreign language skills. The results provide valuable insights into students' attitudes towards MALL and the factors influencing its acceptance and integration into their language learning practices.

The first research question aimed to identify students' perceptions of MALL's usefulness. The answer to this question lies in the descriptive statistics analysis of the survey's constructs. Of the six constructs mentioned, the three with the highest mean scores are PEOU with 4.515, PO with 4.41, and PU with 4.392.

The mean scores for the PEOU construct indicate that students generally found MALL to be easy to use, with scores ranging from 4.50 to 4.54, suggesting a high level of comfort and familiarity with the applications. This finding aligns with previous research that has shown that ease of use is a critical factor in the success of MALL (Bhestari & Luthfiyyah, 2021; Hsu & Lin, 2021; Ebadi & Raygan, 2023).

The Perceived Outcome (PO) scores indicate that students perceive a high level of realizing their learning objectives through MALL experiences, with scores ranging from 4.36 to 4.48. This finding suggests that students feel a connection between their language learning aims and attaining them by using MALL. This finding concurs with Habib et al. (2022), although no other research has been found to identify this factor. Thus, this becomes one of the contributions of this research to the literature. Furthermore, this factor may enhance student motivation and engagement in language learning.

The overall mean score for PU indicates a strong agreement among students regarding MALL's utility in their language learning journey. Specifically, students felt that MALL increased their overall productivity and performance, provided more control over assignments, helped with linguistic concerns, and assisted in better accomplishing their assignments. These high scores suggest that students recognize tangible benefits from incorporating MALL into their language learning practices. This finding is consistent with previous research showing that PU predicts technology adoption (Morchid, 2019; Hoi & Mu, 2020; Habib, 2022).

The descriptive statistics indicate that students have positive perceptions of MALL, with high ease of use, perceived usefulness, and perceived social outcomes. These findings suggest that MALL has the potential to be an effective tool for language learning in diverse educational contexts.

Several factors may contribute to these positive perceptions of MALL. First, its accessibility and convenience stem from integration with smartphones, which are ubiquitous among students, enabling learning anytime and anywhere. This ease of access likely enhances productivity and time savings. Additionally, MALL applications offer personalized learning experiences, allowing students to focus on their specific linguistic needs, as evidenced by the high agreement with statements about increased control over assignments. The immediate feedback and progress tracking provided by many MALL apps may further support students' perceptions of improved performance and productivity. Finally, the diverse learning resources available in MALL address various aspects of language learning and help students with different linguistic concerns.

The second research question aimed at attaining the main predictive factors for Ecuadorian undergraduate polytechnic students' acceptance to integrate MALL into their language learning practices. The answer to this question lies in the multivariate regression analysis performed.

As reported in the results section, this study revealed a robust collective significance effect between the constructs and students' acceptance of MALL, as indicated by a significant F-value ($F(3.96) = 54.36$, $p < 0.001$) and a high R^2 value (0.63). This finding suggests that the predictors PO, SI, and PU collectively explain a substantial portion of the variance in students' acceptance of MALL.

The significance of PO as a predictor suggests that students' acceptance of MALL is strongly influenced by their perception of tangible results. The high mean scores for improved English skills ($M = 4.46$) and time savings ($M = 4.42$) indicate that students who experience or anticipate positive outcomes are more likely to accept and integrate MALL into their learning practices. This finding aligns with expectancy-value theories of motivation, where the expectation of positive outcomes drives engagement and persistence in learning activities.

The emergence of SI as a significant predictor highlights the importance of social context in technology acceptance. High agreement with statements about MALL enhancing teamwork possibilities ($M = 4.38$) and serving as a good social networking tool for effective language learning ($M = 4.28$) suggests that the social aspects of MALL contribute significantly to its acceptance. This finding may be particularly relevant in the Ecuadorian context, where collective culture and social relationships play important roles. The voluntary nature of MALL use outside the classroom ($M = 4.42$) further indicates that peer influence and social norms may be driving adoption.

The strong influence of PU on MALL acceptance underscores the importance of practical benefits in driving technology adoption. Students' high agreement with statements about increased productivity, better assignment completion, and help with linguistic concerns indicates that the perceived practical value of MALL is a critical factor in its acceptance.

Furthermore, a significant relationship was identified between students' perceived outcomes when using MALL and their acceptance of the tool. However, evidence on this issue in the literature is scarce, which makes this finding the second main contribution of this study to the existing literature. Likewise, Social influence is another factor that predicts the acceptance of MALL. The results show a positive relationship between students' social influence and their acceptance of MALL ($t = 2.876$, $p < 0.000$). This finding is consistent with the literature (Morchid, 2019; Botero et al., 2022; Habib et al., 2022), which suggests that social influence plays a crucial role in students' motivation and engagement in language learning. The construct Perceived Usefulness depicts a strong relationship with students' acceptance of MALL ($t = 6.025$, $p < 0.000$). This finding also aligns with previous research (Azli et al., 2018; Hsu & Lin, 2021; Ebadi & Raygan, 2023) that highlights the importance of perceived usefulness in the adoption of new technologies in education.

7. Conclusions

This research investigated Ecuadorian undergraduate polytechnic students' perspectives regarding using MALL tools to enhance their foreign language abilities. Specifically, two primary concerns were addressed: understanding students' perception of MALL's utility and determining the principal predictors influencing its acceptance among learners.

This investigation yielded the following insights. In analyzing the perceptions, the researcher could determine that students exhibited favorable views toward MALL. These results indicate that learners can receive this tool well. Furthermore, the analysis identified a robust collective significance effect between the six constructs, used from the adapted Technology Acceptance Model, and students' acceptance of MALL. Moreover, three predictors emerged as the most important for learners' acceptance: Perceived Outcomes, Perceived Usefulness, and Social Influence. These three constructs collectively explained over half the variability in students' willingness to adopt MALL integration.

Throughout this exploration, the researcher has contributed to closing the gap in the knowledge emerging from South American countries, specifically from Ecuador, by identifying Perceived Outcomes as a previously unrecognized yet influential factor affecting the acceptance of MALL. Also, this study has confirmed the established links between social influence and perceived usefulness alignment with previous works.

Notwithstanding the findings, it remains necessary to acknowledge certain limitations inherent to this project. First, the sample size was comprised solely of Ecuadorian undergraduate students at a public polytechnic university, limiting the generalization of results beyond similar demographics or geographic regions. Therefore, it is suggested that a larger sample size should be used for future research, using different universities in Ecuador. Another limitation of this study

lies in the data collection tool used. The self-report measures via surveys could introduce possible response biases due to influences caused by respondents' interpretative variations and personal motivational influences. Thus, for future research, it is suggested that a mixed-methods study combining multiple data collection tools, such as interviews, focus groups, or observational studies, be conducted. That way, triangulation would be in play, allowing for convergence of evidence.

Several implications stem from the findings depicted in this study. With an improved student awareness of the benefits of using MALL, learners could take advantage of engaging materials tailored to their needs, leading to autonomic outside-the-classroom learning. Also, learners can receive customizable support aligned with their preferred styles and pace, optimizing their growth paths through MALL. Teachers who adopt MALL can be more creative when designing tasks and experimenting with blended and flipped classroom learning environments. They can provide flexible, interactive, and personalized tools such as those mentioned in this document, Google Docs, or Grammarly, where learners can draft, edit, and refine their writing while receiving real-time feedback. These tools can be integrated into curriculum assignments to encourage frequent writing practice and peer collaboration. Furthermore, teachers can benefit from ongoing professional development focused on MALL competencies, supporting their lifelong careers and adapting to evolving teaching demands.

Declaration of generative AI in scientific writing

While preparing this work, the author used ChatGPT to create a comprehensive outline for this paper. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the publication's content.

Conflict of interest

The author declares that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Abuzandah, S. (2020). Social skills for homeschooling students. *Creative Education*, *11*(7), 1064-1072. https://doi.org/10.4236/ce.2020.117078

Agustina, N., Mayuni, I., Iskandar, I., & Ratminingsih, N. M. (2022). Mobile learning application: Infusing critical thinking in the EFL classroom. *Studies in English Language and Education*, *9*(2), 724-743. https://doi.org/10.24815/siele.v9i2.23476

Al-Adwan, A. S. (2020). Investigating the drivers and barriers to moocs adoption: The perspective of Tam. *Education and Information Technologies, 25*(6), 5771-5795. https://doi.org/10.1007/s10639-020-10250-z

Al-Rahmi, W. M., Yahaya, N., Aldraiweesh, A. A., Alamri, M. M., Aljarboa, N. A., Alturki, U., & Aljeraiwi, A. A. (2019). Integrating technology acceptance model with Innovation Diffusion Theory: An empirical investigation on students' intention to use E-Learning Systems. *IEEE Access, 7*, 26797-26809. https://doi.org/10.1109/access.2019.2899368

Al-Shehab, M. A. (2020). The role of Mobile-Assisted Language Learning (MALL) in enhancing the writing skills of intermediate IEP students: Expectations vs reality. *Language Teaching Research Quarterly*, *20*, 1-18. https://doi.org/10.32038/ltrq.2020.20.01

Alfadda, H. A., & Mahdi, H. S. (2021). Measuring students' use of Zoom application in language courses based on the technology acceptance model (TAM). *Journal of Psycholinguistic Research, 50*(4), 883-900. https://doi.org/10.1007/s10936-020-09752-1

Aliakbari, M., & Mardani, M. (2022). Mobile-Assisted Language Learning and its effects on learners' speaking development. *Education Research International*, *2022*(1), 1-14. https://doi.org/10.1155/2022/9043326

Almusharraf, N. (2020). Teachers' perspectives on promoting learner autonomy for vocabulary development: A case study. *Cogent Education*, *7*(1), 1823154. https://doi.org/10.1080/2331186x.2020.1823154

Andrade, C. (2020). The inconvenient truth about convenience and purposive samples. *Indian Journal of Psychological*

Medicine, *43*(1), 86-88. https://doi.org/10.1177/0253717620977000
Aratusa, Z. C., Suriaman, A., Darmawan, D., Marhum, M., Rofiqoh, R., & Nurdin, N. (2022). Students' perceptions on the use of Mobile-Assisted Language Learning (MALL) in learning pronunciation. *International Journal of Current Science Research and Review*, *5*(7), 2652-2660. https://doi.org/10.47191/ijcsrr/v5-i7-50
Arini, D. N., Hidayat, F., Winarti, A., & Rosalina, E. (2022). Artificial intelligence (AI)-based mobile learning in ELT for EFL learners: The implementation and learners' attitudes. *International Journal of Educational Studies in Social Sciences (IJESSS)*, *2*(2), 88-95. https://doi.org/10.53402/ijesss.v2i2.40
Awada, G. (2016). Effect of WhatsApp on critique writing proficiency and perceptions toward learning. *Cogent Education*, *3*(1), 1264173. https://doi.org/10.1080/2331186x.2016.1264173
Ayan, E. (2020). Descriptive analysis of Emoticons/Emoji and persuasive digital language use in WhatsApp messages. *Open Journal of Modern Linguistics*, *10*(4), 375-389. https://doi.org/10.4236/ojml.2020.104022
Azli, W. U. A. W., Shah, P. M., & Mohamad, M. (2018). Perception on the usage of Mobile Assisted Language Learning (MALL) in English as a Second Language (ESL) learning among vocational college students. *Creative Education*, *9*(1), 84-98. https://doi.org/10.4236/ce.2018.91008
Barrett, A., Pack, A., Guo, Y., & Wang, N. (2020). Technology acceptance model and multi-user virtual reality learning environments for Chinese Language education. *Interactive Learning Environments, 31*(3), 1665-1682. https://doi.org/10.1080/10494820.2020.1855209
Belda-Medina, J. (2021). Enhancing multimodal interaction and communicative competence through Task-Based Language Teaching (TBLT) in Synchronous Computer-Mediated Communication (SCMC). *Education Sciences*, *11*(11), 723. https://doi.org/10.3390/educsci11110723
Bhandari, L. P. (2020). Task-based language teaching: A current EFL approach. *Advances in Language and Literary Studies*, *11*(1), 1. https://doi.org/10.7575/aiac.alls.v.11n.1p.1
Bhestari, B. M., & Luthfiyyah, R. (2021). EFL students' perceptions towards the use of MALL to promote students' learning autonomy. *Academic Journal Perspective: Education, Language, and Literature*, *9*(2), 77-87. https://doi.org/10.33603/perspective.v9i2.6012
Bieńkowska, I., Klimczok, A., Polok, K., & Modrzejewska, J. (2021). Use of Mobile Assisted Language learning (MALL) in teaching vocabulary to ESP students. *International Journal of Research*, *12*(3), 81-95. https://ijrte.penpublishing.net/makale/2614
Botero, G. G., Nguyet, D. A., Botero, J. G., Zhu, C., & Questier, F. (2022). Acceptance and use of Mobile-Assisted Language Learning by higher education language teachers. *Lenguaje*, *50*(1), 66-92. https://doi.org/10.25100/lenguaje.v50i1.11006
Chien, Y. C., Wu, T. T., Lai, C. H., & Huang, Y. M. (2022). Investigation of the influence of artificial intelligence markup language-based LINE chatbot in contextual English learning. *Frontiers in Psychology*, *13*, 785752. https://doi.org/10.3389/fpsyg.2022.785752
Chuah, K., & Kabilan, M. K. (2021). Teachers' views on the use of chatbots to support English language teaching in a mobile environment. *International Journal of Emerging Technologies in Learning (IJET)*, *16*(20), 223. https://doi.org/10.3991/ijet.v16i20.24917
Chuah, K., & Kabilan, M. K. (2022). The development of mobile applications for language learning: A systematic review of theoretical frameworks. *International Journal of Learning, Teaching and Educational Research*, *21*(8), 253-270. https://doi.org/10.26803/ijlter.21.8.15
Cronje, J., & Van Zyl, I. (2022). WhatsApp as a tool for building a learning community. *The Electronic Journal of e-Learning*, *20*(3), 296-312. https://doi.org/10.34190/ejel.20.3.2286
Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *Management Information Systems Quarterly*, *13*(3), 319. https://doi.org/10.2307/249008
De Vega, N., Basri, M., & Nur, S. (2023). Integrating mobile-assisted learning for a dynamic blended approach in higher education. *Indonesian Journal of Electrical Engineering and Computer Science*, *32*(2), 819. https://doi.org/10.11591/ijeecs.v32.i2.pp819-827
Ebadi, S., & Raygan, A. (2023). Investigating the facilitating conditions, perceived ease of use and usefulness of Mobile-Assisted Language Learning. *Smart Learning Environments*, *10*(1), 30. https://doi.org/10.1186/s40561-023-00250-0
Elaish, M. M., Hussein, M. H., & Hwang, G. (2022). Critical research trends of mobile technology-supported English language learning: A review of the top 100 highly cited articles. *Education and Information Technologies*, *28*(5), 4849-4874. https://doi.org/10.1007/s10639-022-11352-6
García-Gómez, A. (2020). Learning through WhatsApp: students' beliefs, L2 pragmatic development, and interpersonal relationships. *Computer Assisted Language Learning*, *35*(5-6), 1310-1328. https://doi.org/10.1080/09588221.2020.

1799822
Habib, S., Haider, A., Suleman, S. S. M., Akmal, S., & Khan, M. A. (2022). Mobile assisted language learning: evaluation of accessibility, adoption, and perceived outcome among students of higher education. *Electronics*, *11*(7), 1113. https://doi.org/10.3390/electronics11071113
Hoi, V. N., & Mu, G. M. (2020). Perceived teacher support and students' acceptance of mobile-assisted language learning: Evidence from Vietnamese higher education context. *British Journal of Educational Technology*, *52*(2), 879-898. https://doi.org/10.1111/bjet.13044
Hsu, H. T., & Lin, C. C. (2021). Extending the technology acceptance model of college learners' mobile-assisted language learning by incorporating psychological constructs. *British Journal of Educational Technology*, *53*(2), 286-306. https://doi.org/10.1111/bjet.13165
Huang, F., Teo, T., & Zhou, M. (2017). Factors affecting Chinese English as a foreign language teachers' technology acceptance: A qualitative study. *Journal of Educational Computing Research, 57*(1), 83-105. https://doi.org/10.1177/0735633117746168
Jeong, K. (2022). Facilitating sustainable self-directed learning experience with the use of Mobile-Assisted Language Learning. *Sustainability*, *14*(5), 2894. https://doi.org/10.3390/su14052894
Jung, G. W. (2020). Engaging mobile-assisted learning activities using multiple mobile apps for foreign language practice. In *Advances in educational technologies and instructional design book series* (pp. 203-220). https://doi.org/10.4018/978-1-7998-1435-1.ch012
Juniardi, Y., Herlina, L., Lubis, A. H., Irmawanty, I., & Pahamzah, J. (2020). Computer- vs. mobile-assisted learning to promote EFL students' speaking skills: A preliminary classroom-based research. *International Journal of Instruction*, *13*(3), 417-432. https://doi.org/10.29333/iji.2020.13329a
Kang, H. (2013). A guide on the use of factor analysis in the assessment of construct validity. *Journal of Korean Academy of Nursing*, *43*(5), 587. https://doi.org/10.4040/jkan.2013.43.5.587
Karakaya, K., & Bozkurt, A. (2022). Mobile-Assisted Language Learning (MALL) research trends and patterns through bibliometric analysis: Empowering language learners through ubiquitous educational technologies. *System*, *110*, 102925. https://doi.org/10.1016/j.system.2022.102925
Keezhatta, M. S., & Omar, A. (2019). Enhancing reading skills for saudi secondary school students through Mobile Assisted Language Learning (MALL): An experimental study. *International Journal of English Linguistics*, *9*(1), 437. https://doi.org/10.5539/ijel.v9n1p437
Kener, N. F. M. (2018). Mobile assisted language learning for developing students' attitudes. *Journal of Reading and Knowledge, 18*(2), 1-32. https://doi.org/10.21608/mrk.2018.102178
Kessler, M. J. (2021). Supplementing Mobile-Assisted Language Learning with reflective journal writing: A case study of Duolingo users' metacognitive awareness. *Computer Assisted Language Learning*, *36*(5-6), 1040-1063. https://doi.org/10.1080/09588221.2021.1968914
Lai, Y., Saab, N., & Admiraal, W. (2022). University students' use of mobile technology in self-directed language learning: Using the integrative model of behavior prediction. *Computers & Education*, *179*, 104413. https://doi.org/10.1016/j.compedu.2021.104413
Li, R. (2023). Effects of Mobile-Assisted Language Learning on EFL Learners' listening skill development. *Educational Technology & Society*, *26*(2), 36-49. http://index.j-ets.net/Published/26_2/ETS_26_2_03.pdf
Liaqat, A., Munteanu, C., & Epp, C. D. (2020). Collaborating with mature english language learners to combine peer and automated feedback: A user-centered approach to designing writing support. *International Journal of Artificial Intelligence in Education*, *31*(4), 638-679. https://doi.org/10.1007/s40593-020-00204-4
Lin, J., & Lin, H. (2019). Mobile-assisted ESL/EFL vocabulary learning: A systematic review and meta-analysis. *Computer Assisted Language Learning*, *32*(8), 878-919. https://doi.org/10.1080/09588221.2018.1541359
Lin, C. C., Lin, V., Liu, G., Kou, X., Kulikova, A., & Lin, W. (2019). Mobile-assisted reading development: a review from the Activity Theory perspective. *Computer Assisted Language Learning*, *33*(8), 833-864. https://doi.org/10.1080/09588221.2019.1594919
Liu, X., & Moeller, A. J. (2019). Promoting learner engagement through interactive digital tools. In *Breaking Barriers, Building Bridges, Promoting Performance* (pp. 33-51). Faculty Publications: Department of Teaching, Learning and Teacher Education. https://www.researchgate.net/publication/331889632_Promoting_Learner_Engagement_through_Interactive_Digital_Tools
Liu, C., Zowghi, D., Kearney, M., & Bano, M. (2020). Inquiry-based mobile learning in secondary school science education: A systematic review. *Journal of Computer Assisted Learning*, *37*(1), 1-23. https://doi.org/10.1111/jcal.12505
Luo, Y., & Watts, M. (2022). Exploration of university students' lived experiences of using smartphones for English

language learning. *Computer Assisted Language Learning, 37*(4), 608-633. https://doi.org/10.1080/09588221.2022.2052904

Ma, M., Chen, J., Pei-Yun, Z., & Wu, Y. (2019). Factors affecting EFL teachers' affordance transfer of ICT resources in China. *Interactive Learning Environments*, *30*(6), 1044-1059. https://doi.org/10.1080/10494820.2019.1709210

Magaji, A. (2021). Promoting problem-solving skills among secondary science students through problem based learning. *International Journal of Instruction*, *14*(4), 549-566. https://doi.org/10.29333/iji.2021.14432a

Margolis, A. A. (2020). Zone of proximal development, scaffolding and teaching practice. *Cultural-Historical Psychology, 16*(3), 15-26. https://doi.org/10.17759/chp.2020160303

Morchid, N. (2019). The determinants of use and acceptance of mobile assisted language learning: The case of EFL students in Morocco. *Arab World English Journal*, *5*, 76-97. https://doi.org/10.24093/awej/call5.7

Mortazavi, M., Nasution, M. K. M., Abdolahzadeh, F., Behroozi, M., & Davarpanah, A. (2021). Sustainable learning environment by Mobile-Assisted Language Learning methods on the improvement of productive and receptive foreign language skills: A comparative study for asian universities. *Sustainability*, *13*(11), 6328. https://doi.org/10.3390/su13116328

Nuraeni, C., Carolina, I., Supriyatna, A., Widiati, W., & Bahri, S. (2020). Mobile-Assisted Language Learning (MALL): Students' perception and problems towards mobile learning in english language. *Journal of Physics: Conference Series*, *1641*(1), 012027. https://doi.org/10.1088/1742-6596/1641/1/012027

Nychkalo, N., Jin-Ba, W., Lukianova, L., Пазюра, Н. В., & Муранова, Н. П. (2020). Use of task-based approach in teaching vocabulary to business english learners at university. *Advanced Education*, *7*(16), 98-103. https://doi.org/10.20535/2410-8286.215117

Ramzan, M., Javaid, Z. K., Kareem, A., & Mobeen, S. (2023). Amplifying classroom enjoyment and cultivating positive learning attitudes among ESL learners. *Pakistan Journal of Humanities and Social Sciences*, *11*(2), 2298-2308. https://doi.org/10.52131/pjhss.2023.1102.0522

Sato, T., Murase, F., & Burden, T. (2015). Is Mobile-Assisted Language Learning really useful? An examination of recall automatization and learner autonomy. In F. Helm, L. Bradley, M. Guarda & S. Thouësny (Eds.), *Critical CALL-Proceedings of the 2015 EUROCALL Conference, Padova, Italy* (pp. 495-501). Dublin: Research-publishing.net. https://doi.org/10.14705/rpnet.2015.000382

Shadiev, R., Liu, T., Shadiev, N., Fayziev, M., Gaevskaya, E., Zhussupova, R., & Otajonov, O. (2021). Exploring affordances and student perceptions of MALL in familiar environments. In *Innovative Technologies and Learning: 4th International Conference, ICITL 2021, Virtual Event, November 29-December 1, 2021, Proceedings 4* (pp. 397-412). Springer International Publishing. https://doi.org/10.1007/978-3-030-91540-7_41

Shortt, M., Tilak, S., Kuznetcova, I., Martens, B., & Akinkuolie, B. (2021). Gamification in Mobile-Assisted Language Learning: A systematic review of Duolingo literature from public release of 2012 to early 2020. *Computer Assisted Language Learning*, *36*(3), 517-554. https://doi.org/10.1080/09588221.2021.1933540

Sulistiyo, U., Al Arif, T. Z., Handayani, R., Ubaidillah, M. F., & Wiryotinoyo, M. (2022). Determinants of Technology Acceptance Model (TAM) towards ICT use for English language learning. *Journal of Language and Education, 8*(2), 17-30. https://doi.org/10.17323/jle.2022.12467

Taber, K. S. (2017). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, *48*(6), 1273-1296. https://doi.org/10.1007/s11165-016-9602-2

Tahar, A., Riyadh, H. A., Sofyani, H., & Purnomo, W. E. (2020). Perceived ease of use, perceived usefulness, perceived security and intention to use E-filing: The Role of Technology Readiness. *The Journal of Asian Finance, Economics and Business, 7*(9), 537-547. https://doi.org/10.13106/jafeb.2020.vol7.no9.537

Thuong, L. H. T., & My, D. T. (2023). Students' attitudes towards mobile applications in learning English listening skills at Ho Chi Minh university of foreign languages and information technology. *VNU Journal of Science: Education Research*. https://doi.org/10.25073/2588-1159/vnuer.4703

Turuk, M. C. (2008). The relevance and implications of Vygotsky's sociocultural theory in the second language classroom. *Annual Review of Education, Communication, and Language Sciences, 5*(1), 244-262. https://research.ncl.ac.uk/media/sites/researchwebsites/arecls/turuk_vol5.pdf

Uyanık, G. K., & Güler, N. (2013). A study on multiple linear regression analysis. *Procedia-Social and Behavioral Sciences*, *106*, 234-240. https://doi.org/10.1016/j.sbspro.2013.12.027

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes (vol. 86)*. Harvard University Press. https://ci.nii.ac.jp/ncid/BA03570814

Wang, Y., & Hsu, L. (2020). Shall we go to the MALL?-Students' perceptions of a business english learning app. *International Journal of Information and Education Technology*, *10*(2), 110-116. https://doi.org/10.18178/ijiet.2020.10.2.1348

Wilder, J., & Lillvist, A. (2021). Teachers' and parents' meaning making of children's learning in transition from preschool to school for children with intellectual disability. *European Journal of Special Needs Education*, *37*(2), 340-355. https://doi.org/10.1080/08856257.2021.1889847

Xu, J., Fan, Y., & Xu, Q. (2019). EFL learners' corrective feedback decision-making in task-based peer interaction. *Language Awareness*, *28*(4), 329-347. https://doi.org/10.1080/09658416.2019.1668003

Yusoff, M. S. B. (2019). ABC of content validation and content validity index calculation. *Education in Medicine Journal*, *11*(2), 49-54. https://doi.org/10.21315/eimj2019.11.2.6

Zhang, D., Wang, M., & Wu, J. G. (2020). Design and implementation of augmented reality for English language education. In V. Geroimenko (Ed.), *Augmented Reality in Education. Springer Series on Cultural Computing.* Springer, Cham. https://doi.org/10.1007/978-3-030-42156-4_12

Zhou, Y., & Deocampo, M. F. (2023). A study of kunming no.3 middle school students' perceptions on Task-Based Language Teaching (Tblt) approach in the english classroom. *The EUrASEANs: Journal on Global Socio-Economic Dynamics*, *6(43)*, 370-379. https://doi.org/10.35678/2539-5645.6(43).2023.370-379

Zubani, M., Sigalini, L., Serina, I., Putelli, L., Gerevini, A., & Chiari, M. (2022). A performance comparison of different cloud-based natural language understanding services for an Italian e-learning platform. *Future Internet*, *14*(2), 62. https://doi.org/10.3390/fi14020062

Çakmak, F. (2019). Mobile learning and mobile assisted language learning in focus. *Language and Technology*, *1*(1), 30-48. https://dergipark.org.tr/en/download/article-file/665969