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Advancing Writing Proficiency through Mobile Learning: Exploratory Factor Analysis Among Uzbekistan EFL Undergraduates

(Memajukan Kecekapan Menulis melalui Pembelajaran Mudah Alih: Analisis Faktor Eksploratori dalam Kalangan Pelajar EFL Uzbekistan)

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ABSTRACT

It is crucial to comprehend how EFL undergraduates accept mobile learning as it gets more and more included in higher education. Few studies examine the underlying factor structure of mobile learning acceptance in EFL contexts, even though there are numerous models available for evaluating technology adoption. The validity and reliability of the constructs related to Uzbekistan EFL undergraduates' acceptance of mobile learning are examined in this study. Participants in the study included 732 students from five Uzbekistan public universities. Seven major factors: cultural factors, normative beliefs, motivation to comply, perceived language learning potential, comprehensible input, self-management of learning, and behavioral intention were identified through exploratory factor analysis, which consisted of 26 items. Bartlett's test was significant ($p < 0.001$) and the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.897, indicating that the dataset was appropriate for factor analysis. A well-structured factor solution was also indicated by the fact that all of the retained items had factor loadings above the acceptable threshold except one. The findings imply that the identified constructs offer a valid and trustworthy framework for understanding mobile learning acceptance in EFL education for enhancing writing skills.

Keywords: EFL writing skills; technology acceptance; Higher education; mobile learning; EFA analysis.

ABSTRAK

Memahami bagaimana pelajar EFL peringkat sarjana muda menerima pembelajaran mudah alih menjadi semakin penting apabila teknologi ini semakin banyak digunakan dalam pendidikan tinggi. Walaupun terdapat banyak model untuk menilai penerimaan teknologi, hanya sedikit kajian yang meneliti struktur faktor asas penerimaan pembelajaran mudah alih dalam konteks EFL. Kajian ini meneliti kesahan dan kebolehpercayaan konstruk yang berkaitan dengan penerimaan pembelajaran mudah alih dalam kalangan pelajar EFL Uzbekistan. Seramai 732 pelajar dari dua universiti awam di Uzbekistan mengambil bahagian dalam kajian ini. Tujuh faktor utama—faktor budaya, kepercayaan normatif, motivasi untuk mematuhi, potensi pembelajaran bahasa yang dirasakan, input yang boleh difahami, pengurusan pembelajaran kendiri, dan niat tingkah laku—telah dikenal pasti melalui analisis faktor eksploratori (EFA) yang menghasilkan 25 item. Ujian Bartlett adalah signifikan ($p < 0.001$), dan ukuran kecukupan persampelan Kaiser-Meyer-Olkin (KMO) adalah 0.87, menunjukkan bahawa set data ini sesuai untuk analisis faktor. Penyelesaian faktor yang berstruktur dengan baik juga ditunjukkan oleh hakikat bahawa semua item yang dikekalkan mempunyai pemuatan faktor di atas ambang yang boleh diterima. Dapatan kajian ini menunjukkan bahawa konstruk yang dikenal pasti menyediakan rangka kerja yang sah dan boleh dipercayai untuk memahami penerimaan pembelajaran mudah alih dalam pendidikan EFL.

Kata kunci: Kemahiran menulis EFL; penerimaan teknologi; pendidikan tinggi; pembelajaran mudah alih; analisis EFA.

INTRODUCTION

This study examines the main elements impacting Uzbekistani EFL undergraduates' use of mobile learning for writing skill development. This study aims to ascertain how constructs like cultural influences, normative beliefs, motivation to comply, self-management of learning, and perceived language learning potential impact students' behavioral intention to adopt mobile learning, given the ongoing difficulties university students face in writing proficiency. This study offers empirical insights into the viability of mobile learning as an instructional tool for improving writing in Uzbekistan. The results will add to the expanding corpus of MALL research and provide useful suggestions for academics, decision-makers, and organizations looking to maximize the uptake of mobile learning in higher education. According to recent studies, mobile learning has changed EFL instruction by offering accessible and flexible learning options, especially in areas with strong internet connections (Kim & Park 2022; Liu et al. 2023). However, the degree of its influence varies according to institutional support, pedagogical integration, and technological accessibility. Several global programs, like UNESCO's Mobile Learning Week, emphasize how digital tools may help close educational inequalities and advance inclusive learning environments everywhere (UNESCO 2021). The usefulness of mobile-assisted language learning (MALL) in enhancing writing abilities through gamification, collaborative learning, and AI-powered feedback mechanisms is particularly highlighted by research done in a variety of EFL contexts, such as China, Saudi Arabia, and South Korea (Alshammari, Park & Adas 2021). Despite these developments worldwide, Uzbekistan has yet to fully integrate mobile learning for EFL writing (Akhmedov & Kodirova 2021). Nevertheless, the widespread use of mobile technology for social contact and general communication, organized teaching and learning activities that integrate mobile learning in academic settings, particularly for improving writing skills are still in their infancy (Yusupova 2020). The absence of institutional policies that support digital learning approaches and the disparities in technical preparation between teachers and students are two major obstacles (Safiullina & Solnyshkina 2022).

Namely, the State Testing Centre of Uzbekistan (2021) reports that only 18% of university graduates achieve a B2 level in writing, and less than 5% achieve C1 proficiency, which is required by the President's Law N-5117 (2021), which calls for an improvement in English language competency in all four skills, but writing is still a major weakness for many students. The body of research on mobile learning in English-speaking environments emphasizes the necessity for empirical data and details particularly related to the writing skills of EFL students (Yildirim Yayilgan & Shaikh 2023). Although there is a dearth of research expressly addressing the improvement of writing skills through mobile learning, there is a fair amount of literature on the integration of mobile learning to teach language skills (Mamatova 2023). Even though traditional lecture-based teaching methods are still used, Uzbekistan's curriculum places a strong emphasis on rote memory over real-world application, which restricts students' access to real-world writing assignments (Akmetova, Shamatov & Tajik 2022). Interactive, technology-enhanced learning approaches are scarce in instructional tactics dominated by textbooks and PowerPoint presentations (Zakirova et al. 2021). According to UNDP research from 2023, just 30% of Uzbek university students regularly have access to mobile devices and dependable internet, which exacerbates the digital divide and prevents the full adoption of mobile learning technology (UDNP Annual Report 2023).

By examining the major determinants of Uzbekistani EFL undergraduates' acceptance of mobile learning for the development of writing skills, this study seeks to close this research gap. It specifically looks at how students' behavioral intention to adopt mobile learning is influenced by factors such as cultural influences, normative beliefs, compliance incentives, self-management of learning, and perceived language learning potential. This study adds to the expanding corpus of MALL research by offering empirical insights into the effectiveness of mobile learning as a teaching tool. It also provides useful suggestions for educators, legislators, and organizations looking to improve writing instruction through digital technology.

LITERATURE REVIEW

I. PREVIOUS STUDIES ON MOBILE LEARNING IN EFL CONTEXTS

In this age of endless possibilities, the integration of technology into the educational sector is essential to guaranteeing its continuous advancement, especially in the sphere of education (Ebadi & Bashir 2021). Digital storytelling, data visualization, and interactive presentations provide novel approaches to presenting research findings and engaging audiences. Furthermore, research has focused on multimodal composition principles and guidelines in the EFL writing classroom (Dzekoe 2017; Lim & Polio 2020; Miller-Cochran 2017). Multiple sources were used to cultivate advanced research and writing abilities, as well as the practice of procedural processes such as drafting and asking for feedback (Azar 2023). However, as the primary

stakeholders impacted by this process are educators and students, their viewpoints are essential to the successful use of technology in the classroom (Crompton & Bluke 2018; Ebadi & Bashir 2021). The success of this endeavor depends critically on the attitudes of the educational community, which consists of teachers and students (Gayed et al. 2022). Even if mobile devices are getting more and more common, Sharples et al. (2019) stress that uneven access to technology, especially in rural or underdeveloped areas, might lead to differences in learning outcomes. The use of technology in the classroom is still controversial, even though some students still favor traditional face-to-face training (Gayed et al. 2022). Regarding technology integration, students are more concerned about the technical proficiency of their professors (Hashim et al. 2020). According to students, teachers must be technically proficient to provide a relevant and interesting learning environment for teaching to be effective (Jeanjaroonsri 2023). While student opinions are important, it is also critical to examine the perspectives of other stakeholders in the educational process, particularly teachers (Hashim & Yunus 2018). Teachers play an important role in promoting excellent teaching and learning experiences by effectively integrating technology (Hasim et al. 2018). Teachers' opinions highlight the significance of technology in improving instruction and encouraging lifelong learning (Li & Hafner 2022). The use of technology promotes continuous learning, allowing students to learn at their own speed (Malmquist 2022).

II. TECHNOLOGY ADOPTION IN MOBILE LEARNING: A TPB PERSPECTIVE

The Theory of Planned Behavior (TPB) (Ajzen 1991), which describes how attitudes, subjective standards, and perceived behavioral control affect behavioral intention, is the foundation for this investigation. Since this study looks at Uzbekistani EFL undergraduates' readiness to use mobile learning to improve their writing skills, TPB offers an appropriate framework for investigating how social expectations, personal views, and self-control affect the adoption of mobile learning. TPB is closely relevant to studies on technology adoption since it asserts that a person's behavioral intention is the best indicator of their actual behavior (Ajzen 1991; Hew et al. 2022). Students' desire to use mobile learning platforms is strongly influenced by their behavioral intention, according to research in educational technology (Teo et al. 2021; Kim & Lee 2023). TPB offers a solid theoretical framework for comprehending how the adoption of mobile learning is impacted by peer and societal expectations (Fishbein & Ajzen 1975; Ajzen, 1991; Yang & Liu, 2021). According to earlier research, normative factors significantly influence students' acceptance of digital learning technologies in collectivist societies (Ibrahim & Al-Kadi 2023). According to research, self-regulated students who feel more in control of their online education are more likely to use mobile learning platforms successfully (Mills et al. 2022). Furthermore, earlier research highlights that the relationship between behavioral intention and actual technology use might be moderated by perceived behavioral control, especially in educational contexts where digital infrastructure differs (Rahman & Islam 2022). Recent studies have successfully used TPB to investigate students' adoption of digital learning tools, demonstrating its well-established relevance to educational technology research (Teo et al. 2021; Hew et al. 2022; Kim & Lee 2023). Since mobile learning involves various behavioral, social, and technical components, TPB is a suitable paradigm for examining the intricate interactions between these elements and the development of EFL writing abilities. This study's explicit grounding in TPB guarantees a coherent and well-supported theoretical framework that complements the constructs being studied and advances our knowledge of the acceptance of mobile learning in non-Western educational contexts. Apart from this Huang et al. (2021) examine how cultural and environmental factors impact behavioral intention toward online learning, revealing notable distinctions in adoption trends between German and Chinese university students. The importance of psychological elements in technology acceptance is further supported by Cheng and Xie's (2020) meta-analytic evidence that self-efficacy is a key determinant of students' behavioral intention in mobile learning environments. Based on the Unified Theory of Acceptance and Use of Technology (UTAUT2), which highlights behavioral intention as a crucial factor in technology adoption (Venkatesh, Thong, & Xu 2012), this study also uses exploratory factor analysis (EFA), which is advised in methodological research on structural equation modeling, to validate measurement models and guarantee construct reliability (Marley et al. 2024).

III. MOBILE LEARNING AS A SOLUTION TO IMPROVE ENGLISH WRITING SKILLS

The current study addresses important issues that students in standard educational frameworks encounter by examining mobile learning as a viable approach to enhancing writing abilities among EFL undergraduates. According to studies, by providing constant exposure and practice, mobile learning which facilitates interactions with the target language both inside and outside of the classroom can significantly improve language acquisition (Huang & Zhang 2021). With increased access to digital materials designed for language learning, MALL has become a viable

choice for EFL learners in Uzbekistan due to the country's growing mobile device usage and enhanced internet infrastructure (Yusupova 2020; Nazirova et al.2022). MALL enables students to overcome the temporal and spatial constraints that are frequently connected to traditional classroom-based education (Nazirova et al.2022). The way that students view mobile learning as a reliable academic instrument is another important factor to consider (Park & Slater 2021). Some students might view MALL as less formal or rigorous than traditional techniques, even if many are familiar with mobile apps for social and recreational purposes (Harwati 2022). According to a study by Hasanov (2023), EFL students in Uzbekistan frequently doubt the educational worth of mobile platforms, viewing them as supplementary rather than essential learning resources. Students can readily switch from academic assignments to social media or other extracurricular activities, which exacerbates this view and detracts from the focus and continuity needed to acquire complicated abilities like writing (Herro et al. 2021). Additionally, to address various cognitive needs unique to language acquisition, MALL implementations must negotiate the complexity of the instructional design (Zhang 2021). Nguyen and Tran (2022), for example, note that badly designed mobile apps might cause cognitive overload, in which students are exposed to too much or poorly organized knowledge that impairs understanding and memory.

METHODOLOGY

RESEARCH DESIGN

To determine the factors impacting Uzbek EFL undergraduates' adoption of mobile learning, this study used a cross-sectional quantitative research (Schmidt & Brown 2019 p. 206) methodology with an online survey questionnaire. In addition to gathering demographic data, the survey was intended to assess seven important factors associated with the acceptance of mobile learning: cultural influences, normative beliefs, motivation to comply, perceived language learning potential, comprehensible input, self-management of learning and behavioral intention. Respondents received thorough instructions, a description of the study's goals, and a quick overview of mobile learning before filling out the questionnaire. The study employed a systematic random sampling (Creswell & Creswell 2017) procedure to guarantee an impartial selection of participants. Randomly chosen undergraduate EFL students from five public universities in Uzbekistan were included in the sampling frame, 732 undergraduate students participated in the study. By guaranteeing representation from a range of demographic and educational backgrounds, the sample was created to improve the findings' generalizability and dependability (Kumar 2023; Taherdoost 2022).

ETHICAL CONSIDERATIONS

The Republic of Uzbekistan's Ministry of Higher Education, Science, and Innovations granted ethical approval for this study on March 15, 2024, guaranteeing adherence to human subjects' research ethics and guidelines (Reference No: 4/17-4/1-2182). Voluntary participation, informed permission, anonymity, and confidentiality were all upheld in this study (Resnik 2020). The goal of the study, any possible dangers, and the freedom to discontinue participation at any moment without repercussions were all explained to the participants. No personally identifiable information was gathered, and all replies were anonymized to preserve privacy. By ethical research norms, the collected data was safely preserved and utilized only for study.

RESEARCH SAMPLE/PARTICIPANTS

This study focuses on Uzbekistani undergraduates enrolling in Uzbekistan's governmental higher education institutions. These institutions are currently under the administration of the Uzbekistan government. The phrase "EFL learners" refers to people who are seeking bachelor's degrees but have not yet to graduate and come from a variety of demographic backgrounds. According to the Higher Education Organization's data for 2022–2023, Uzbekistan has 65 public universities. The number of EFL undergraduate students has surpassed 100,000 (https://fledu.uz). As a result, the population size of the study includes over 100,000 undergraduate students enrolled in Uzbekistan's public universities.

A rigorous random sampling technique was used in the study to guarantee an impartial participant selection. All eligible undergraduate EFL students from five public universities in Uzbekistan were included in the sampling frame; 732 undergraduates in total participated. The 732-sample size was chosen by the literature's recommendations, which state that stable factor solutions for Exploratory Factor Analysis (EFA) require a minimum sample-to-item ratio of 5:1 or a minimum of 300 respondents (Marley et al. 2019; Tabachnick & Fidell 2019). A larger sample size was considered necessary to ensure robustness, factor stability, and generalizability of the findings because the study evaluated smart components with numerous items per construct. According to Costello and Osborne (2005), a higher sample size also reduces

sampling error and enhances the dependability of factor extraction in EFA. Participants received detailed instructions, a summary of the study's goals, and an explanation of mobile learning applications before beginning the questionnaire. Table1 demonstrates details of demographic results.

Table 1. Demographic Distribution of Respondents

Variable	Descriptor	Frequency (N)	Percentage (%)
Gender	Male	70	9.6%
	Female	662	90.4%
Age	18–20 years old	667	91.1%
	21–25 years old	63	8.6%
	26–30 years old	2	0.3%
Education	Freshman	472	64.5%
Level	Sophomore	89	12.2%
	Junior	33	4.5%
	Senior	138	18.9%
Living	Tashkent	187	25.5%
Area	Samarkand	223	23.9%
	Bukhara	152	20.8%
	Khorezm	119	16.3%
	Karakalpakstan	49	13.6%
Mobile	None	22	8.0%
Learning	Limited	211	18.6%
Experience	Moderate	355	53.7%
	Extensive	144	19.7%
Device	Smartphone	643	87.8%
Owned	Tablet	15	2.0%
	Desktop Computer	24	3.3%
	Laptop	50	6.8%

DATA COLLECTION METHOD/ INSTRUMENTATION

This study used Google Forms, a popular online survey platform renowned for its usability, accessibility, and real-time data management features, to enable effective data collecting (Evans & Mathur 2019). Google Forms was chosen because it can simplify the dissemination and collection process, removing issues with paper-based surveys such as high costs, logistical limitations, and mistakes in manual data entry (Smyth & Christian 2024). Furthermore, respondents could participate whenever it was most convenient for them, which ensured increased response rates while preserving the security and integrity of the data (Couper 2019). It is the best option for carrying out extensive quantitative research in educational settings because the automated data collection also reduces the number of missed replies and makes it easier to export data for statistical analysis (Marley et.al 2018).

The survey included twenty-six items in seven areas that evaluated different facets of the adoption of mobile learning. A five-point Likert scale was used to score the participants' degree of agreement (1 being strongly disagreed and 5 being strongly agree). Before administering the research instrument in the field study, the data from the pilot study were subjected to EFA to ensure its reliability (Reio et al.2015). Following the analysis, the items for each construct were renamed before the main survey. Two experts from Malaysian higher education institutions reviewed the questionnaire and gave feedback. This stage was essential for verifying the constructs' internal consistency and validity. The items were adopted from reliable sources Venkatesh et al. (2012), Fishben (1991), Chapelle (2010), Krashen (1983).

DATA ANALYSIS METHOD

Data analysis had been conducted using the Statistical Package for the Social Sciences (SPSS; Version 26.0). The distributional qualities of the items and the characteristics of the respondents were summarized using descriptive statistics. The validity of the instrument was assessed using an exploratory factor analysis (EFA). The Kaiser–Meyer–Olkin (KMO) measure (Kaiser1960) and Bartlett's test of sphericity (Bartlett, 1950) were used to determine whether the data was suitable for conducting an EFA in the first phase. Principal component analysis (PCA) was then used to extract factors, and a scree plot or eigenvalue analysis was used to assess the number of factors (Cattell 1966). A varimax rotation was used to improve interpretability. The strength of each variable's association with a factor was finally ascertained by analyzing factor loadings (Marley et al. 2018). Using Cronbach's alpha, item analysis, and Pearson's correlation, the procedure concluded by evaluating the instruments' reliability.

FINDINGS AND DISCUSSION

EFA, or exploratory factor analysis, was used in this investigation. The dataset was assessed using the Kaiser–Meyer–Olkin (KMO) measure of sample adequacy and Bartlett's test of sphericity to determine the appropriateness of the data for factor extraction and to determine the adequacy of the sample size before the factor analysis. Table 2 demonstrates that the data are appropriate for factor analysis based on the KMO measure of sampling adequacy, which achieved a value of.897. This finding suggests that there are high enough correlations between the variables to continue the research (Kaiser 1960). The data's

suitability for factor analysis is further supported by Bartlett's test of sphericity, which found that the correlation matrix differs significantly from an identity matrix with an approximate chi-square value of 6772,426 and a significance level of.000 (Bartlett 1950). To ascertain whether the data satisfied the statistical requirements for doing EFA, several preliminary tests were essential. All things considered; these results show that the dataset is suitable for factor analysis to investigate the study's underlying constructs.

Table 2. KMO and Barlett`s test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.897
Bartlett's Test of Sphericity	Approx. Chi-Square	6772.426
	df	325
	Sig.	.000

To investigate the data about accepting mobile learning for writing skills improvement, principal component analysis (PCA) was employed. By maximizing the variance of squared loadings for each component, varimax rotation with Kaiser normalization a technique frequently used in factor analysis was applied in this study to elucidate the factor structure. To help choose how many components to keep, the scree plot (Cattell 1966) was also utilized. A seven-factor solution is supported by the scree plot, which is shown in Figure 1.

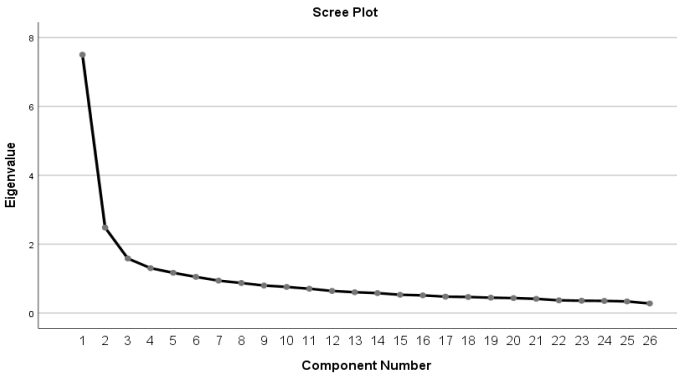

Figure 1. Scree Plot

The total variation explained by the components derived from factor analysis is shown in Table 3. For every component, it shows the rotation sums of squared loadings, extraction sums of squared loadings, and initial eigenvalues. The extraction and rotation sums of squared loadings show the total variance explained upon rotation, whereas the original eigenvalues show the variance individually explained by each component. The eigenvalues above 1 and the interpretability of the factor solution led to the choice to keep seven factors. Along with the corresponding component loadings, it also shows how to extract seven components from the scale. Based on eigenvalues greater than 1, the cumulative variance explained by these components came to 58.058%.

Table 3. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7,501	28,851	28,851	7,501	28,851	28,851	3,473	13,359	13,359
2	2,482	9,545	38,396	2,482	9,545	38,396	2,600	10,001	23,360
3	1,585	6,097	44,493	1,585	6,097	44,493	2,583	9,934	33,294
4	1,306	5,021	49,514	1,306	5,021	49,514	2,326	8,948	42,242
5	1,170	4,500	54,014	1,170	4,500	54,014	2,166	8,332	50,574
6	1,052	4,044	58,058	1,052	4,044	58,058	1,946	7,484	58,058
7	,942	3,622	61,680						
8	,874	3,361	65,041						
9	,800	3,077	68,118						
10	,760	2,921	71,039						
11	,708	2,722	73,761						
12	,643	2,474	76,235						
13	,606	2,331	78,566						
14	,580	2,232	80,798						
15	,532	2,048	82,846						

continue ...

... cont.

16	,515	1,982	84,827
17	,478	1,837	86,664
18	,468	1,799	88,464
19	,447	1,720	90,184
20	,436	1,677	91,860
21	,414	1,591	93,451
22	,371	1,427	94,878
23	,359	1,381	96,259
24	,354	1,360	97,619
25	,339	1,304	98,923
26	,280	1,077	100,000

According to the findings of the Exploratory Factor Analysis (EFA), six factors accounted for 58.06% of the variance and had eigenvalues higher than 1.0. Subsequent components each contributed between 4% and 9.55% of the variance, with the first factor accounting for 28.85%. These results are consistent with other research on the adoption of mobile learning, which frequently reports multi-dimensional factor structures (Marley et al. 2024). The adoption of mobile learning among EFL learners is influenced by various educational, motivational, and social factors, according to similar studies like Huang et al. (2021), which support the validity of the identified components. The rotation sums of squared loadings confirmed that the six extracted factors were meaningfully distinct, further reinforcing the robustness of the measurement model. These findings provide empirical evidence supporting the multifaceted nature of mobile learning acceptance, contributing to a deeper understanding of EFL students' digital learning behaviors. In contrast to previous studies that reported a higher variance explanation (Cheng & Xie 2020, with 65% variance explained), this study suggests that additional factors, such as institutional policies and technological barriers, may play a role in Uzbekistan's mobile learning context.

The findings of the principal component analysis using Kaiser normalization and varimax rotation are displayed in the rotated component matrix. The factor solutions were described using items with loadings greater than ±.30 that had high factor loadings on those statements. The robustness of the factor interpretation was ensured by adhering to the acceptable loading criteria (Marley et al. 2018). The evaluation of the seven-factor structure showed that the factor loadings varied between.322 and.868, as shown in Table 4, indicating that the factor loadings were deemed acceptable. To gain insight into the relationships between items and factors, this matrix was utilized to determine whether academic writing skills were linked to particular mobile learning dimensions.

Table 4. Rotated Component Matrix

Statements	**Component**					
	1	**2**	**3**	**4**	**5**	**6**
I intend to continue using mobile writing apps in the future.		,551				
I will always try to use mobile writing apps in my daily life.		,767				
I plan to continue to use mobile writing skill apps frequently		,731				
I think I am/have been learning English writing skills in a mobile learning manner.		,724				
Mobile Learning enhances my confidence in learning English writing skills.				,564		
Mobile Learning enhances my motivation in learning English writing skills				,734		
I would likely get enough information when I use mobile learning to improve my English writing skills				,701		
I would likely get enough practice for improving my English writing skills when I use mobile learning				,682		
I believe that mobile learning is better when information is understandable.	,722					
I enjoy the mobile learning experience because I understand the language used.	,750					

continue ...

... cont.

I can use mobile learning because the language used is simple and easy to understand.	,664				
My language comprehension with mobile learning helps me improve my English writing skills	,541				
Mobile learning is achievable when the language used suits my language ability.	,596				
Mobile learning helps me to manage my study time effectively for learning English writing skills.	,512				
Do Uzbek cultural values and traditions influence your desire to use mobile learning applications to improve your English writing skills?					,762
How important is it for mobile learning content to be culturally sensitive and relevant to your experiences as an EFL learner in Uzbekistan?					,837
Do your family members support your use of mobile devices for English language learning?		,736			
Do your friends support your using mobile devices for language learning?		,668			
Do your teachers support your using mobile devices for language learning?		,794			
Do your university authorities support your use of mobile devices for language learning?		,732			
How often do your family members' opinions influence your use of mobile devices for language learning?			,608		
How often do your friends` opinions influence your use of mobile devices for language learning?			,841		
How often do your teachers` opinions influence your use of mobile devices for language learning?			,814		

Strong concept validity was indicated by factor loadings in the six-factor solution that the Exploratory Factor Analysis (EFA) yielded. Since they satisfied the minimally acceptable criterion for significant factor interpretation, items with loadings greater than 0.5 were kept (Marley et al. 2018). Items about students' motivation to keep using mobile learning to develop their writing skills made up the first element, behavioral intention. The second element, Normative Beliefs, had statements that illustrated how peers, family, instructors, and university officials shaped the acceptance of mobile learning. Perceived Language Learning Potential (PLLP), the third element, included students' enthusiasm and confidence in using mobile learning to improve their English writing skills. The fourth component, Comprehensible Input, measured how simple it is to comprehend the material in mobile learning settings. The significance of culturally relevant content in the adoption of mobile learning was emphasized by the fifth component, Cultural Influences. Motivation to Comply, the sixth element, assessed the frequency with which outside factors impact mobile learning practices. Weak correlations and component cross-loadings led to the removal of three items from the Self-Management of Learning dimension from the final analysis which led to removal of the whole construct (Marley et al.2024). To improve the measurement model's clarity and dependability and make sure that the items that were kept made a substantial contribution to their respective constructs, they had to be excluded (Tabachnick & Fidell 2019). These results are consistent with earlier research that found motivational and cultural factors are important determinants of mobile learning adoption in EFL contexts (Huang et al. 2021). However, this study indicates that social and environmental variables are more important in Uzbekistan's higher education landscape than in previous studies where technology constraints were significant determinants (Cheng & Xie 2020). The rotating factor solution strengthened the instrument's structural validity by confirming each component's uniqueness. To further evaluate the items' distributional characteristics, descriptive statistics were calculated. The items' means, standard deviations, skewness, and kurtosis are shown in Table 5, along with important details about the replies' distribution and properties.

Table 5. Item Means Standard Deviation, Skewness, and Kurtosis

Items	**N**	**Mean**	**Skewness**		**Kurtosis**	
	Statistic	**Statistic**	**Statistic**	**Std. Error**	**Statistic**	**Std. Error**
BI1	732	3,65	-,657	,090	,425	,180
BI2	732	3,47	-,415	,090	-,418	,180

continue ...

... cont.

BI3	732	3,53	-,589	,090	-,002	,180
BI4	732	3,46	-,414	,090	-,237	,180
PLLP1	732	3,42	-,459	,090	-,002	,180
PLLP2	732	3,52	-,456	,090	-,058	,180
PLLP3	732	3,74	-,705	,090	,512	,180
PLLP4	732	3,64	-,543	,090	,065	,180
CI1	732	3,69	-,819	,090	,474	,180
CI2	732	3,72	-,694	,090	,570	,180
CI3	732	3,67	-,563	,090	,218	,180
CI4	732	3,75	-,782	,090	,890	,180
CI5	732	3,79	-,907	,090	1,158	,180
CF1	732	2,71	,109	,090	-,747	,180
CF2	732	3,14	-,085	,090	-,325	,180
NB1	732	3,34	-,257	,090	-,686	,180
NB2	732	3,56	-,473	,090	-,238	,180
NB3	732	3,17	-,173	,090	-,592	,180
NB4	732	3,12	-,082	,090	-,701	,180
MC1	732	2,99	-,015	,090	-,534	,180
MC2	732	2,93	-,231	,090	-,785	,180
MC3	732	3,11	-,218	,090	-,452	,180

A moderate distribution with few extreme deviations is suggested by the mean scores for skewness and kurtosis values, which are primarily within the permissible range. These findings support the data's compliance with normal assumptions, allowing for additional statistical analysis. To assess the correlation between the items in each subscale, Cronbach's alpha coefficients were calculated (Table 6). The degree of correlation between the items in each subscale is shown by Cronbach's alpha coefficients, which varied from 646 to 844, indicating that the measures are reliable for assessing the intended constructs.

Table 6. Reliability Statistics

Scale Construct	Number of items	Cronbach's Alpha Value (α)
Cultural Factors	2	0,659
Normative beliefs	4	0,646
Motivation to Complaints	3	0,687
Perceived Language Learning Potential	4	0,813
Comprehensible Input	5	0,844
Behavioral intention	4	0,830

According to the study's findings, students consistently view mobile learning as a useful tool for comprehending and improving their English writing abilities (Hashim & Yunus 2018). The Comprehensible Input and Perceived Language Learning Potential constructs showed the highest reliability (α = 0.844 and α = 0.813, respectively). The growing availability of mobile learning resources, which offer organized and interactive content catered to learners' language proficiency, may be the reason for this high reliability.

Table 7. Summary of Findings on Mobile Learning Acceptance for Writing Skill Development

Research Objectives	Findings	Key References
1. To examine the major determinants influencing Uzbekistani EFL undergraduates' acceptance of mobile learning for writing skill development.	Six key factors were identified: Behavioral Intention, Perceived Language Learning Potential, Comprehensible Input, Cultural Influences, Normative Beliefs, and Motivation to Comply. These factors explained 58.06% of the variance, supporting the multidimensional nature of mobile learning acceptance.	Marley et al. (2024); Huang et al. (2021)
2. To analyze the role of behavioral intention in mobile learning adoption.	Behavioral Intention (α = 0.830) was a strong predictor, confirming that students are willing to adopt mobile learning if they perceive it as beneficial.	Ajzen (1991); Fishbein & Ajzen (1975)

... cont.

3. To evaluate the influence of cultural factors and normative beliefs on mobile learning adoption.	Cultural Factors (α = 0.659) and Normative Beliefs (α = 0.646) showed moderate influence, suggesting that peer, family, and institutional support shape mobile learning adoption, though with variability.	Fishbein & Ajzen (1975); Ajzen (1991); Teo (2020)
4. To assess the impact of motivation to comply on students' behavioral intention to adopt mobile learning.	Motivation to Comply (α = 0.687) indicated that external pressures (teachers, peers, institutions) significantly impact mobile learning adoption, reinforcing the role of social norms in technology use.	Fishbein & Ajzen (1975); Ajzen (1991); Teo (2020)
5. To investigate the impact of Perceived Language Learning Potential (PLLP) and Comprehensible Input (CI) on mobile learning adoption.	PLLP and CI were the strongest predictors. CI factor loadings (ranging from .541 to .750) showed that structured and clear content enhances writing skill development.	Krashen (1985); Cheng & Xie (2020)
6. To explore the role of self-management of learning in mobile learning adoption.	Self-Management of Learning was removed due to low factor loadings and cross-loading issues, indicating that students still rely on teacher-centered learning approaches.	Zhou et al. (2020)
7. To provide empirical insights into the viability of mobile learning as an instructional tool for improving writing skills in Uzbekistan.	Findings validate mobile learning as a promising tool for writing instruction, but challenges related to cultural adaptation, instructional support, and digital access remain barriers to full adoption.	Yildirim Yayilgan & Shaikh (2023); Mamatova (2023)

The varied sociocultural influences on students' attitudes toward technology adoption may be the reason why normative beliefs (α = 0.646) and cultural factors (α = 0.659) show somewhat poorer reliability. Since external factors, such as family and institutional policies, frequently differ greatly among populations, similar studies, like those by Huang et al. (2021) and Teo (2020), have similarly revealed low dependability for social and cultural dimensions. However, this study indicates that Uzbekistani EFL students encounter more diverse external pressures, resulting in a less consistent response pattern (Khamraeva et al.2024), in contrast to Venkatesh, Thong, and Xu (2016), who discovered greater reliability in normative beliefs among digital learners in Western environments. These results suggest that although mobile learning is generally acknowledged to improve motivation and comprehensibility, sociocultural acceptance is still a variable aspect that necessitates customized approaches to better incorporate mobile learning into Uzbekistan's educational system.

CONCLUSION

The fundamental elements impacting Uzbekistani EFL undergraduates' adoption of mobile learning to improve writing skills were examined in this study using exploratory factor analysis (EFA). Behavioral intention, perceived language learning potential, comprehensible input, cultural influences, normative beliefs, and motivation to comply are the six main constructs that were discovered by the research. The results showed that the two strongest predictors were Perceived Language Learning Potential (α = 0.813) and Comprehensible Input (α = 0.844), underscoring the importance of perceived utility and language accessibility in adopting mobile learning. On the other hand, Normative Beliefs (α = 0.646) and Cultural Factors (α = 0.659) showed modest reliability, indicating that adoption may not be highly influenced by external social factors alone. These observations support the ideas of the Theory of Planned Behavior and Krashen's Input Hypothesis, which emphasize the need for behavioral intention and intelligible input in technology-assisted language learning. The study comes to the conclusion that although mobile learning has a lot of potential for improving EFL writing abilities, its success hinges on combining organized input, engagement that is driven by incentives, and institutional support. These results underline the necessity of more robust institutional support and culturally aware mobile learning tools to improve writing skills. To maximize student engagement, universities should use AI-driven feedback and adaptive learning technology. The use of self-reported data is a drawback, though, and further qualitative and longitudinal research is required to examine changing student perspectives. Overall, even though mobile learning is known to improve writing abilities, pedagogical improvements and policy changes are necessary for long-term adoption in the EFL setting of Uzbekistan.

REFERENCES

Akhmedov, S., & Kodirova, K. 2021. *Effective ways of teaching writing skills for B1 learners in the Uzbek educational system*. International Journal of Educational Technology, 5, 97–101. https://www.researchgate.net/publication/356540819

Akmetova, G., Shamatov, D., & Tajik, M. 2022. *Education in Central Asia: Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan.* Journal of Central

Asian Studies. https://doi.org/10.1108/S1479-36792022000043B003

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

Ajzen, I. 2002. Perceived behavioral control, self□ efficacy, locus of control, and the theory of planned behavior. Journal of Applied Social Psychology, 32(4), 665–683. https://doi.org/10.1111/j.1559-1816.2002.tb00236.x

Azar T. 2023. Wikipedia: One of the last, best internet spaces for teaching digital literacy, public writing, and research skills in first year composition. *Computers and Composition*, 68, 102774. https://doi.org/10.1016/j.compcom.2023.102774

Cheng, X., & Xie, K. (2020). The relationship between students' self-efficacy and behavioral intention in mobile learning: A meta-analysis. *Computers & Education, 158*, 103987. https://doi.org/10.1016/j.compedu.2020.103987

Creswell, J. D., & Creswell, J. W. 2018. *Research design: Qualitative, quantitative, and mixed methods approach.* Sage Publications.

Crompton, H., & Burke, D. 2018. *The use of mobile learning in higher education: A systematic review*. Computers and Education, 123, 53–64. https://doi.org/10.1016/j.compedu.2018.04.007

Ebadi, S., & Bashir, S. 2021. *An exploration into EFL learners' writing skills via mobile-based dynamic assessment.* Education and Information Technologies, 26, 1995–2016. https://doi.org/10.1007/s10639-020-10348-4

Gayed, J. M., Carlon, M. K. J., Oriola, A. M., & Cross, J. S. 2022. *Exploring an AI-based writing assistant's impact on English language learners.* Computers and Education: Artificial Intelligence, 3, 100055. https://doi.org/10.1016/j.caeai.2022.100055

Gharehblagh, N. M., & Nasri, N. 2020. *Developing EFL elementary learners' writing skills through mobile-assisted language learning (MALL)*. Teaching English with Technology, 20(1), 104–121. https://files.eric.ed.gov/fulltext/EJ1242657

Cohen L., Manion L., Morrison K. 2018. *Research methods in education*. Routledge Taylor & Francis Group.

Hashim, H, Yunus, M.M. & Embi, M.A. 2016. *Does Language Learning Potential Affects ESl Learners' Attitude Towards Mobile Learning?* International Journal of Education, Islamic Studies and Social Sciences Research.

Hashim, H.U. & Yunos, M.M. 2018. *English as a Second Language (ESL) Learning: Setting the Right Environment for Second Language Acquisition*. TADRIS: Journal of Education and Teacher Training. 207-215

Hew, K. F., Qiao, C., & Tang, Y. 2022. Understanding student engagement in large-scale open online courses: A systematic review. *Computers & Education, 179*, 104413. https://doi.org/10.1016/j.compedu.2021.104413

Higher Education Organization. 2023. *Data on public universities in Uzbekistan*. Retrieved from https://fledu.uz

Huang, F., Teo, T., & Scherer, R. 2021. Investigating the antecedents of university students' behavioral intention to use online learning: A comparative study of China and Germany. *Educational Technology Research and Development, 69*(1), 1-23. https://doi.org/10.1007/s11423-020-09800-3

Jeanjaroonsri, R. 2023. *Thai EFL learners' use and perceptions of mobile technologies for writing.* LEARN Journal: Language Education and Acquisition Research Network, 16(1), 169–193. https://so04.tcithaijo.org/index.php/LEARN/article/view/263438

Kamal, S. S. B. M., & Aziz, A. A. 2021. *Utilizing mobile learning in writing skills in ESL classrooms.* International Journal of Academic Research in Business and Social Sciences, 11(12), 2206–2220. https://doi.org/10.6007/IJARBSS/v11-i12/11166

Khamraeva, S. D., Hashim, H., & Jamaludin, K. A. 2024. *Mobile learning for transforming English writing skills: A systematic review (2013–2023)*. International Journal of Interactive Mobile Technologies (iJIM, 18(19), 47729. https://doi.org/10.3991/ijim.v18i19.47729

Kukulska-Hulme, A. 2012. *Mobile learning and the future of learning*. Learning, Media and Technology, 37(3), 303–315. https://doi.org/10.1080/17439884.2012.701572

Kukulska-Hulme, A., Lee, H., & Norris, L. 2017. *Mobile learning revolution: Implications for language pedagogy.* In C. Chapelle & S. Sauro (Eds.), The handbook of technology and second language teaching and learning (pp. 217–233). Wiley. https://doi.org/10.1002/9781118914069.ch15

Kumar, B. A., & Goundar, M. S. 2019. *Usability heuristics for mobile learning applications*. Education and Information Technologies, 24(6), 3537–3553. https://doi.org/10.1007/s10639-019-09860-z

Kumar, B. A., & Sharma, B. 2020. *Context-aware mobile learning application development: A systematic literature review*. Education and Information Technologies, 25(3), 2221–2239. https://doi.org/10.1007/s10639-019-10045-x

K. Moorthy & N. A. Aziz. 2019. *Mobile learning adoption in higher education: A systematic review.* Computers & Education, 128, 342–363. https://doi.org/10.1007/s10639-018-9783-6

Kumar, B., Goundar, M., & Chand, S. 2019. *Usability guidelines for mobile learning applications: An update*. Education and Information Technologies, 24(6), 3537–3553. https://doi.org/10.1007/s10639-

019-09937-9

Kutlimuratova, B., & Abdulla, U. 2023. *Challenges of teaching English as a foreign language to Uzbek students.* Journal of Education, 8(2), 105–110. http://dx.doi.org/10.5281/zenodo.8138868

Krashen, S.D., & Terrell, T.D. 1983. *The Natural Approach: Language Acquisition in the Classroom.* Oxford University Press.

Li, S., & Hafner, C. A. 2022. *Mobile-assisted vocabulary learning: Investigating effects of multimedia input and self-regulation strategies*. Language Learning & Technology, 26(1), 1–24. http://dx.doi.org/10.1017/S0958344021000161

Liu, X., & Abu Samah, N. 2022. *The impact of mobile-assisted language learning on EFL students' writing skills.* International Journal of Interactive Mobile Technologies (iJIM), 16(15), 46–61. https://doi.org/10.3991/ijim.v16i15.31477

Marley W. Wattkins.2024. *Exploratory Factor Analysis: A Guide to Best Practice*. Sage Journals. Volume 44, Issue 3. https://doi.org/10.1177/0095798418771807

Murtadho, M., Rohmah, R., Jamilah, Z., & Furqon, M. 2023. *The role of digital literacy in improving students' competence in the digital era*. AL-WIJDÃN Journal of Islamic Education Studies, 8, 253–260. http://dx.doi.org/10.58788/alwijdn.v8i2.2328

Nazirova, S. O., Jalolova, S. M., Agzamova, D. B., Mamatova, F. M., & Yusupova, S. B. 2021. *The problems faced by teachers in teaching English as a foreign language in Uzbekistan*. Journal of Law and Sustainable Development, 11(12), e2698. https://doi.org/10.55908/sdgs.v11i12

Park, M., & Slater, T. 2021. *The impact of mobile applications on EFL learners' writing skills*. Journal of Educational Technology & Society, 24(3), 45–58. https://doi.org/10.2307/jets.24.3.45

Ramllah, & Nurkhin, A. 2020. *Analysis of factors affecting behavioral intention to use e-learning: A UTAUT approach*. KnE Social Sciences, 4(6), 1005–1025. https://doi.org/10.18502/kss.v4i6.6658

Robillos, R. J., & Thongpai, J. 2022. *Computer-aided argument mapping within a metacognitive approach: Its impact on students' argumentative writing performance and self-regulated learning.* LEARN Journal: Language Education and Acquisition Research Network, 15(2), 160–186. https://so04.tci-thaijo.org/index.php/LEARN/article/view/259926

Reio, T. G., Jr., & Shuck, B. 2015. *Exploratory factor analysis: Implications for theory, research, and practice.* Advances in Developing Human Resources, 17(1), 12–25. https://doi.org/10.1177/1523422314559804

Saporbaevich, A., & Kodirova, K. 2021. *Effective ways of teaching writing skills for B1 learners in the Uzbek educational syst*em. International Journal of Educational Technology, 5, 97–101. https://www.researchgate.net/publication/356540819

Teo, T., Fan, X., & Du, J. 2021. Technology acceptance among preservice teachers: A meta-analysis of the TAM. Computers & Education, 172, 104262. https://doi.org/10.1016/j.compedu.2021.104262

United Nations Educational, Scientific, and Cultural Organization. 2021, June). *Addressing exclusion in education: A Guide to addressing education systems towards more inclusive learning societies* (Programme Document ED/BLS/BAS/2012/PI/1). Retrieved from the United Nations Educational, Scientific, and Cultural Organization website: http://unesdoc.unesco.org/images/0021/002170/217073e.pdf

Venkatesh, V., Thong, J. Y. L., & Xu, X. 2012. *Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology* (UTAUT2). MIS Quarterly, 36(1), 157–178. https://doi.org/10.2307/41410412

Wong, W. L., Maarop, A. H., & Chuah, K. P. 2022. *Did you run the Telegram? Use of mobile spelling checker on academic writing.* Multilingual Academic Journal of Education and Social Sciences, 10(1), 1–19. https://doi.org/10.46886/MAJESS/v10-i1/7379

X. Zhang. 2021. *Mobile-assisted writing instruction: Affordances, challenges, and future directions.* International Journal of Interactive Mobile Technologies (iJIM, 15(10), 194–207. https://doi.org/10.3991/ijim.v15i10.21519

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