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# Effect of mobile learning on students' satisfaction, perceived usefulness, and academic performance when learning a foreign language

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While the use of mobile technologies for foreign language learning is gaining momentum, little is known about the various factors that can influence the effectiveness of mobile technologies in relation to student performance in learning a foreign language. The study aims to examine various aspects of mobile learning affecting students' satisfaction, the presumed usefulness of using mobile technologies in learning a foreign language, and students' academic performance. Achieving the established study objectives involved using a set of methods, which included theoretical, empirical, and methods of mathematical statistics for quantitative and qualitative processing of research results and statistical verification of their objectivity with Spearman's rank correlation method. The relevance of using mobile technologies in teaching foreign languages to future philologists is substantiated. An experimental study of the effect of various aspects of mobile learning on students' perceived satisfaction in learning a foreign language, their perception of the usefulness of mobile learning, and academic performance is carried out. Different aspects (individual factors) of mobile learning, such as motivation to use mobile learning, the relevance of content provided by mobile learning to student needs, the ubiquity of mobile learning, and self-efficacy, have an impact on students' perceived satisfaction in learning a foreign language and their perception of the usefulness of mobile learning, as well as academic performance. The obtained results present teachers and students with useful information on mobile learning in the context of philological education.

## KEYWORDS

mobile learning, mobile devices, perceived satisfaction, perceived usefulness, academic performance

## Introduction

In recent years, educators have been using a wide range of technological opportunities to improve students' engagement in the educational process. Information and communications technology (ICT) has penetrated daily life, and researchers and practitioners are continuing their attempts to find ways to implement ICT in education (Dudin et al., 2017; Basak et al., 2018). Teaching foreign languages can be viewed as one of the suitable areas of education. In particular, the traditional learning environment focused on the teacher has transformed into individual self-directed learning. It calls for new methods of learning such as mobile learning for studying foreign languages.

Research statistics (Hwang and Tsai, 2011; Persaud and Azhar, 2012; Bukharaev and Wisam Altaher, 2017) allow us to state the high potential for the development of mobile communications and, as a result, predict the popularity of mobile learning. At present, the algorithm of consumer behavior of young people receiving higher education is changing already (Gladilina et al., 2022). They are increasingly actively shaping their educational trajectories using the mobile Internet as an additional resource for learning and self-education (Kukulska-Hulme, 2013).

One of the most important advantages of mobile learning is that its application leads to increased involvement and more efficient and accelerated assimilation of the necessary skills and abilities (Tyurikov et al., 2021). With traditional methods of education, teachers, for example, often need to develop methodological material focused on various situations of interaction between students. The presence of a smartphone, the Internet, and various web resources significantly simplifies the work for the teacher in terms of preparing methodological material and creating the opportunity for students to study and communicate at the same time (Miangah and Nezarat, 2012; Sergeeva et al., 2021). The use of mobile devices in the context of a student group facilitates joint activities and student/student, student/teacher, and student/group interaction (Gillies, 2016). According to Saccol et al. (2010), mobile devices erase the barriers between students and the teacher, are used to jointly develop educational content, increase its availability, update and generate the content of the training course, and help personalize students' obligations.

Today, almost every student has at least one universal (multifunctional) gadget with a set of applications, which allows us to conclude that it is impossible to get around the trend of mobile learning in the modern world (Pechenkina, 2017).

Of interest is the question of whether the use of tools available to students, such as mobile devices, will increase the effectiveness of learning a foreign language and also have a positive impact on academic performance. Moreover, in our opinion, it is also necessary to consider the national characteristics of information perception by Kazakh students,

for whom not textual but audiovisual learning formats are preferable (Ramazanova et al., 2022).

In connection with the foregoing, the study problem is to determine the positive impact of the functional aspects of the mobile form of education on the personal and academic aspects of learning a foreign language.

We believe that mobile learning is not widespread in Kazakhstan, and there are not enough methodological approaches and scientific research that would help teachers develop their own foreign language teaching programs for mobile learning. In this regard, the scientific novelty of the study lies in the fact that it analyzes the influence of such factors as ubiquity, content, interactivity, self-efficacy, academic performance motivation, and perceived satisfaction and usefulness, which will help teachers in Kazakhstan to more actively implement mobile learning, especially under certain restrictions (e.g., during the lockdown caused by the spread of COVID-19).

This study addresses the following research questions:

1. Do various fundamental aspects of mobile learning (ubiquity, content, interactivity, self-efficacy, motivation) affect the personal factors of mobile learning – the perceived satisfaction of students in learning a foreign language, as well as students' perception of the usefulness of mobile learning and academic achievement?
2. Is student achievement affected by their perceived satisfaction in learning a foreign language and students' perceptions of the usefulness of mobile learning?

## Literature review

### The relationship between factors (components) of mobile learning

When analyzing studies on various aspects of the problem, we focus on studies on the essence of mobile learning and the role of mobile technologies in organizing indirect communication necessary for the implementation of the educational process, as well as the use of mobile technologies in the educational process, including learning foreign languages. This will allow us to build a model for studying the relationship between academic performance and perceived satisfaction in the process of mobile learning.

Mobile devices, as one of the forms of modern technologies, invariably attract the attention of researchers (Henderson et al., 2013; Sung et al., 2016), according to whom the combination of e-learning, m-learning, mobile devices, and wireless Internet made learning a foreign language independent of location and time constraints. In our opinion, mobile learning integrates unique features such as ubiquity, self-control,

mobility, interactivity, personalization, and accessibility. Let us take a closer look at these components.

Generally speaking, mobile learning implies e-learning using mobile devices and wireless networks (Vázquez-Cano, 2014). However, researchers pay more attention to the possibilities of distance learning for students. According to Liu et al. (2010), mobile learning refers to any kind of learning that occurs when the student does not have a fixed, predetermined place or learning that occurs when the student uses the capabilities of the offered mobile technologies for learning, which, in our opinion, became especially important during the period of restrictions caused by the spread of COVID-19.

By themselves, distance learning opportunities (the presence of a laptop or smartphone connected to the Internet) do not allow building an effective educational process if other important components are missing. According to Ally (2013), mobile learning is a new, modern model of educational process organization characterized by the following components: educational and methodological support for the study of disciplines; a mobile-oriented environment for educational resources; teaching staff who have trained in the use of mobile technologies and know the methodology of mobile learning; and technical and software support. Each component is an integral element of the effective use of mobile devices in the educational process and is subjected to active discussion in the scientific community.

The most important thing in the context of our study, which we consider necessary to pay attention to, is the interconnected processes that develop in the context of the application of mobile learning. Foti and Mendez (2014) drew attention to the relationship between ubiquity and self-efficacy, considering that m-learning is an innovative pedagogical technology in which the educational process itself is geographically and situationally conditional, and contextually linked to the place and state in which the student is. The term “state,” in our opinion, should be understood as a modern style of effective life. According to Yannick (2007), the use of mobile devices is an important element of “learning on the go” in the system of education management and the development of collaborative work and educational content. Mobile technology should become a “useful daily resource” for the student, providing high-quality curricula and digital content, improving access to learning, and developing competencies (Nesbit et al., 2014).

The understanding of ubiquity is not limited only to geographical features. The possibility of ubiquitous control over the learning process is an important direction in research on the effectiveness of mobile learning. When comparing traditional and mobile learning, researchers discover a relationship between the possibility to monitor learning in real time (allowing, among other things, to neutralize the impact of distracting factors of mobile learning through pedagogical influence), high saturation (Martin and Ertzberger, 2013), optimization of resources (García et al., 2016) educational content (Martin and Ertzberger, 2013),

and interactivity of collaboration tools designed to improve the quality of learning. Sharples (2003) referred to the following tools: general online work on a project, moblogging (mobile blogging), personalized learning, group work, online research, and equal access to learning.

The relationship between the interactivity of learning and the generation of content motivates students to participate in learning activities, as it opens up great opportunities for self-realization, for example, providing “instant input of ideas” for students, “reducing blocking of production,” enhancing interaction between students, enhancing cognitive stimulation and performance (Gil-Rodríguez and Rebaque-Rivas, 2010), “gathering information on a learning problem,” and “documenting one’s own ideas” (Liu et al., 2010; Shishov et al., 2021).

## Organization of teaching foreign languages by means of mobile learning: Academic performance, perceived satisfaction, and usefulness

Research (Godwin-Jones, 2017; Shishov et al., 2021; Malyuga and Petrosyan, 2022) shows that organization of teaching foreign languages by means of mobile learning allows various aspects of mobile learning (ubiquity, content, interactivity, self-efficacy, motivation) to be integrated into the educational process. Using smartphones and tablets allows working with authentic materials and encourages students to be creative, mobile, and flexible in thinking (Hsu et al., 2013). Work with mobile devices contributes to the personality-oriented learning of students; provides many opportunities for differentiated, autonomous, and individual learning; and promotes the introduction of innovative forms of teaching and the expansion of traditional forms of teaching foreign languages (Sandberg et al., 2011). Tasks involving the use of mobile devices contribute to the development of communicative, intercultural, informational, cognitive, and social competencies (Kukulka-Hulme, 2009).

In a study by Lewis (2002), the role of personal factors in the study of a foreign language using mobile learning technologies is noted, the main of which are students’ satisfaction and the perceived usefulness of learning.

Perceived satisfaction, which depends on the beliefs and attitudes of the student (Wu et al., 2010), is understood as the awareness of the value of what he receives in the learning process. It becomes the main factor in the learning process, provided that you enjoy its results. Perceived satisfaction, according to Bolliger and Wasilik (2009), is a vital aspect of learning.

Perceived usefulness of learning refers to how a student subjectively perceives the capabilities of a mobile device to improve learning efficiency. This perception has a direct impact

on the perceived usefulness of a mobile device, which indirectly influences the consent to use mobile technologies in education.

Chavoshi and Hamidi (2019) identified four groups of factors that influence the use of mobile learning, namely, technological, pedagogical, social, and personal. According to their research, the most significant factor in student acceptance of mobile learning is perceived utility.

A study by Reddy et al. (2022) explores the readiness and perception of students using mobile devices for learning. The results of the study demonstrate the willingness and positive attitude of students to use mobile phones for their University studies, as learning becomes more exciting and an independent learning process is facilitated.

Based on the analysis of scientific literature and the increasing spread of mobile technologies and their application in the study of foreign languages, we conclude that various factors influence the effectiveness of mobile learning. However, their poor knowledge makes it necessary to study the influence of such aspects of mobile learning as ubiquity, content, interactivity, self-efficacy, motivation on student satisfaction, the perceived value of mobile learning, and academic performance.

As the study object, we singled out the following fundamental aspects of mobile learning, which are taken as the main variables (influencing factors) considered in this study:

- ubiquity, considered as the students' perception of the level of connectivity offered by mobile learning (Cheon et al., 2012);
- content, considered as the correspondence of the content provided by mobile learning to the needs of students (Heflin et al., 2017);
- interactivity, considered as the effectiveness of interaction between students and educational resources (Heflin et al., 2017);
- self-efficacy, considered as the belief in the effectiveness of one's own actions and the expectation of success from their implementation (Ciampa, 2014); and
- motivation, considered as the student's focus on acquiring new models of behavior when using mobile learning (Ciampa, 2014).

The purpose of the study and analysis of scientific literature made it necessary to solve the following tasks:

1. To determine the effect of different aspects of mobile learning on students' perceived satisfaction in learning a foreign language.
2. To determine the effect of different aspects of mobile learning on students' perception of the usefulness of mobile learning.
3. To determine the effect of different aspects of mobile learning on students' academic performance.

4. To determine the effect of perceived satisfaction with mobile learning on students' academic performance.
5. To determine the effect of perceived usefulness of mobile learning on students' academic performance.

## Methods

This study was conducted as part of the Scholarship of Teaching and Learning (SoTL) and is a systematic study of mobile learning of students in a foreign language. The research includes the study and implementation of mobile learning as the most modern method of learning and was carried out using survey methods and analysis of existing student performance data.

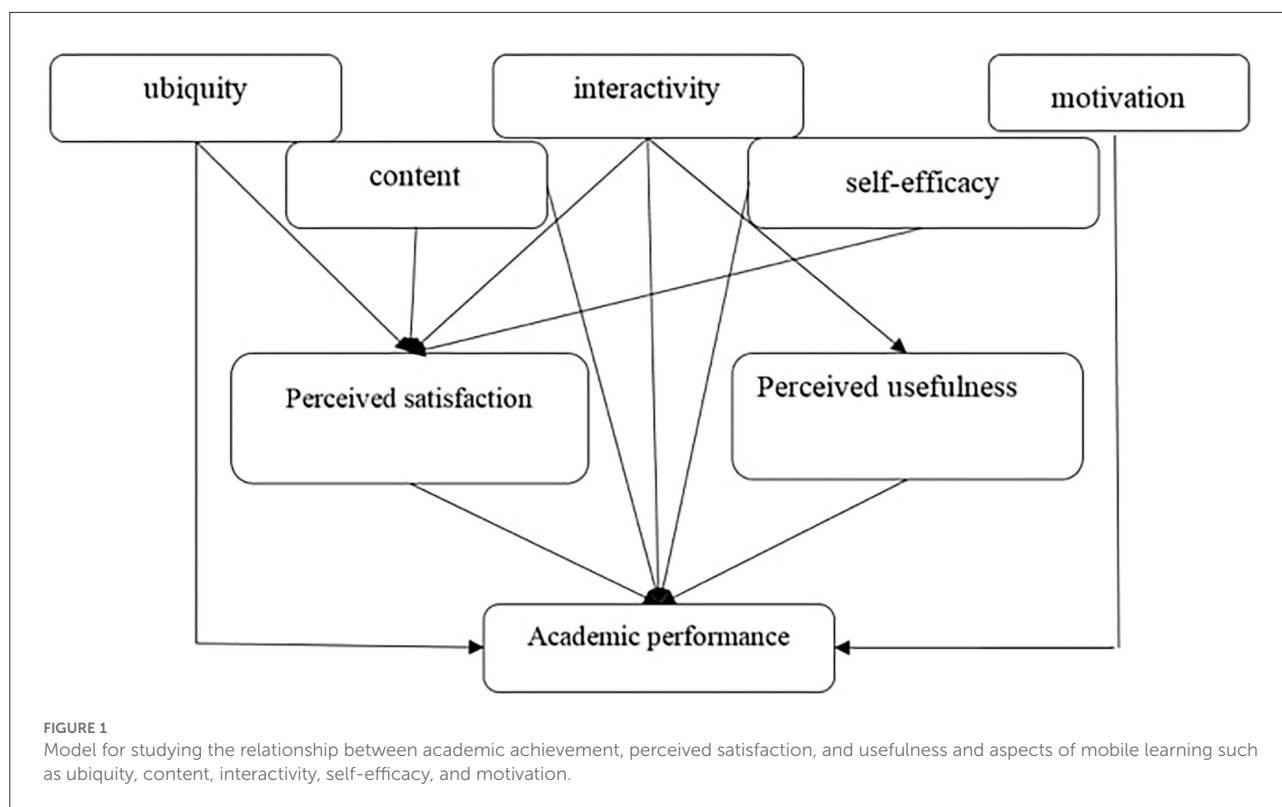
The purpose of the empirical study is to investigate the relationship of these characteristics and aspects to perceive satisfaction and usefulness, as well as their cumulative effect on academic achievement.

The proposed research model of the study includes aspects of mediated mobile learning, as well as students' perceived satisfaction and perceived usefulness of mobile learning and their effect on students' academic performance (Figure 1).

The study involved 150 second-year philology students (bilingual students fluent in Kazakh and Russian) of the K. Zhubanov Aktobe Regional University studying English. The students were motivated to learn English and took part in the study voluntarily. To carry out the research, a group was created on социальной сети VKontakte (this network unites about 100 million users in 2022), which provided effective access to educational materials. The functions of the group administrator were performed by the teacher.

The inclusion of research participants in the VKontakte group allowed them to send completed tasks, have feedback on the results of their implementation, ask questions of interest to them, and receive answers. Study design, as a step-by-step process for conducting a study, included three steps, namely, organizational and methodological, productive, and final.

At the organizational and methodological stage, a plan was developed for the implementation of mobile learning technology in the educational activities of students, as well as the provision of a didactic and technological educational base. To achieve the goal of our experiment, at the first stage of the organizational and methodological stage, the social network VKontakte was chosen, which allows placing tasks for the extracurricular work of students. Among the many advantages of this social network, the determining factor for choosing VKontakte was the ease of use and the ability to quickly access educational materials using mobile devices. That is, students, in most cases, do not need to spend extra time in order to follow the link, because the tasks of the corresponding subject and level of complexity have already been loaded by the teacher. In addition, this media resource



is a tool for sharing content and encourages students to learn together, building skills and abilities in the process of teamwork.

In the second stage of the organizational and methodological stage, the form of training was chosen. For 2 months, we regularly uploaded authentic audio recordings, assignments, and a dictionary of unfamiliar words to the group page, which students had to process every day during the entire training period.

At the end of the organizational and methodological stage, the selection of training tools (authentic audio texts, lexical tasks, and a dictionary) was carried out. The selection was carried out according to several criteria, such as compliance with the language level of students and their educational needs, relevance (correspondence to the topic under study), authenticity, variability, and heterogeneity.

The productive stage included direct control over the participation of students in the process of mobile learning and evaluation of their activities.

At the final stage at the end of the 12 mobile sessions, a survey was conducted of the study participants, aimed at determining:

a) students' perception of the characteristics and aspects of mobile learning indicated in the research design (ubiquity, content, interactivity, self-efficacy, and motivation);

b) perceived satisfaction with mobile learning of a foreign language; and

c) the perceived usefulness of mobile learning a foreign language.

Based on the results of the questionnaire, a statistical analysis was carried out.

One session involved deploying three instruments (described in greater detail below): first, a questionnaire on aspects of mobile learning, then a questionnaire on student satisfaction and perceived usefulness of mobile learning. These questionnaires are a modification of Jung's work (2014), which was tested for convergent validity and reliability [Results of Convergent Validity and Reliability (Jung, 2014, p. 114–115)] (see Appendix).

The final results of the participants' test assignments were collected for further data analysis. Below we present the description of instruments used for data collection.

The questionnaire, addressing the various characteristics and aspects of mobile learning, included five variables, namely, ubiquity, content customization, interactivity, self-efficacy, and motivation to apply mobile learning. Each participant in the study was asked to answer how much he agreed with the points of the questionnaire. When answering, a five-point scale was used, ranging from "strongly disagree" (1 point) to "strongly agree" (5 points).

The questionnaire to determine student satisfaction and usefulness of mobile learning consisted of 12 questions, the answers to which were similarly used on a five-point scale

TABLE 1 The impact of various characteristics and aspects of mobile learning.

Characteristics and aspects of mobile learning	Mobile learning effectiveness factors		
	Perceived satisfaction	Perceived usefulness	Academic achievements
Ubiquity	0.09 ( $p > 0.1$ )	0.39 ( $p < 0.005$ )	0.15 ( $p < 0.1$ )
Content	0.44 ( $p < 0.005$ )	0.14 ( $p < 0.1$ )	0.37 ( $p < 0.005$ )
Interactivity	0.05 ( $p > 0.1$ )	0.13 ( $p < 0.1$ )	0.12 ( $p < 0.1$ )
Self-efficacy	0.06 ( $p > 0.1$ )	0.46 ( $p < 0.005$ )	0.40 ( $p < 0.005$ )
Motivation	0.57 ( $p < 0.005$ )	0.51 ( $p < 0.005$ )	0.45 ( $p < 0.005$ )

TABLE 2 Impact of students' perceived satisfaction and perceived usefulness of mobile learning on academic performance.

Independent variable	Dependent variable	Spearman's rank correlation coefficient (rs)	Significance level
Perceived satisfaction	Academic performance	0.35	<0.005
Perceived usefulness		0.42	<0.005

ranging from “strongly disagree” (1 point) to “strongly agree” (5 points).

Students' grades were taken from the results of their assignments. The achievement test, created by the teacher on the basis of the studied educational material, consisted of 60 questions that allowed assessing the skills of reading, writing, speaking, and listening comprehension, as well as vocabulary and grammar knowledge.

The impact of mobile learning on students' perceived satisfaction and perceived usefulness, as well as their academic performance, was determined through statistical analysis of data obtained based on a sample of 150 philology students in the second year after the completion of mobile classes, using Spearman's rank correlation method. This allowed us to determine the tightness (strength) and direction of pairwise correlations between the characteristics and functional aspects of mobile learning (ubiquity, content, interactivity, self-efficacy, and motivation), on the one hand, and mobile learning effectiveness factors (achievement, perceived satisfaction, and usefulness), on the other hand, as well as between perceived satisfaction and usefulness, on the one hand, and academic achievement (learning achievement), on the other hand.

Spearman's rank correlation coefficient was calculated using the formula:

$$\rho = 1 - \frac{6}{n(n-1)(n+1)} \sum_{n=1}^n (R_n - S_n)^2,$$

where  $R_n$  is the observation rank  $x_n$  in row  $x$ ,  $S_n$  is the observation rank  $y_n$  in row  $y$ ,  $n$  is the number of observations involved in the ranking.

Calculations were carried out automatically (online) on the website <https://www.psychol-ok.ru/statistics/spearman/>.

## Results

The impact of various characteristics and aspects of mobile learning on perceived satisfaction and usefulness of mobile learning (values of Spearman's rank correlation coefficient), as well as on student learning achievement, is presented in Table 1.

A summary of the impact of different characteristics and aspects of mobile learning on perceived satisfaction and usefulness of mobile learning and on learning achievement is provided in Table 1.

As demonstrated in Table 1, perceived satisfaction with mobile learning is highly dependent on the correspondence of the content provided by mobile learning to the needs of students and the motivation to use mobile learning. This finding means that quality improvement in mobile content and motivation will increase the perceived satisfaction with mobile learning. The perceived usefulness of mobile learning is statistically significantly influenced by the ubiquity of mobile learning, self-efficacy, and motivation to use mobile learning. Student performance is statistically significantly influenced by the correspondence of the content provided by mobile learning to student needs, self-efficacy, and motivation.

Thus, the results of the study showed that the most significant characteristics and aspects of mobile learning that influence the factors of adopting mobile learning are increasing the motivation of students to use mobile learning when learning a foreign language (affects all three factors), the correspondence of the content provided by mobile learning to the needs of students and self-efficacy (influencing both factors).

Table 2 contains the results of an analysis of the impact of students' perceived satisfaction with mobile learning and the perceived usefulness of mobile learning on academic performance (values of Spearman's rank correlation coefficient and their corresponding significance levels). As demonstrated

in the table, both students' perceived satisfaction with mobile learning and the perceived usefulness of mobile learning have a significant effect on academic performance.

## Discussion

This study examined the effect of various aspects of mobile learning on students' satisfaction, as well as the perceived usefulness of mobile learning and students' academic performance.

As the results of the study showed the impact of various features and aspects of mobile learning on students' perceived satisfaction with mobile learning, aspects of mobile learning such as ubiquity, interactivity, and self-efficacy do not affect perceived satisfaction. However, matching the content provided by mobile learning to the needs of students and motivation for mobile learning usage do influence students' perceived satisfaction with m-learning.

The results support previous studies indicating that students who find mobile learning relevant to their learning outcomes are more likely to be motivated to actively use it as a technological format of learning (Martin and Ertzberger, 2013; Baideldinova et al., 2021), and students who find mobile learning appropriate for their learning are more inclined to be satisfied due to contextual adaptation (Liu et al., 2010). The findings also show that students' satisfaction can be enhanced by motivating students to mobile learning (Stephens and Pantoja, 2016; Zvyagintseva et al., 2020). The acquired results also confirm the findings of Sung et al. (2016) indicating that computer self-efficacy does not affect user satisfaction with e-learning.

The study results indicate that ubiquity, self-efficacy, and motivation for mobile learning as aspects of mobile learning influence perceived usefulness. However, contextual adaptation (0.13) and interactivity (0.11) do not affect students' perceived usefulness of mobile learning.

The obtained results support research indicating that self-efficacy affects students' perceived usefulness of learning (Henderson et al., 2013; Martin and Ertzberger, 2013).

Also, the results demonstrate that academic performance is affected by the compliance of the content provided by mobile learning with the needs of students, self-efficacy, and motivation for mobile learning, as well as satisfaction and usefulness of mobile learning. These findings support previous studies indicating that students who are satisfied with mobile learning and perceive the usefulness of appropriate technologies in a given learning environment perform better in learning (Wu et al., 2010; Ossokina and Murzalina, 2021).

Deriving from the obtained results, we can note the following.

First, despite the high level of information and communications support for mobile learning, its potential in providing education received within the framework of mobile learning remains insufficiently realized both at the

organizational (University level) and the state levels. Most students are biased against using the opportunity to obtain professional knowledge using mobile learning primarily for subjective reasons (prefer traditional offline learning, believe that the use of mobile technologies distracts from the learning process, etc.). Attention should be paid to the readiness of society and its social institutions to perceive distance education as independent in the mechanism of organizational functioning and conditionally capable of ensuring the quality of acquired professional knowledge, which studies support (Hwang and Tsai, 2011; Sung et al., 2016). Under certain assumptions, we state the presence of a contradiction between the higher education system's proposal to put mobile learning into use (the presence of institutional, scientific and methodological, material and technical, information and communications, and other types of support for it) and the lack of readiness to use it on the part of the potential subjects of educational communication (Chumaceiro Hernandez et al., 2022). In the context of the necessity (possibility) of solving this contradiction, we consider it possible (necessary) to popularize mobile learning in Kazakhstan's higher education sphere by using mobile learning in teaching parts of the material of certain academic subjects/disciplines, for example, a foreign language. According to El-Hussein and Cronje (2010), the realization of this direction of work will not only increase the popularity of mobile learning among student youth but also contribute to the overall development of the culture of distance learning in them.

Second, considering the significance of motivation for mobile learning revealed in the study, it is important to accentuate the need for constant correction of the system of motivation for higher education applicants in terms of accounting for the factors that determined their preference for the mobile form of learning (Ally, 2013).

In our study, we did not reveal that technical problems in the operation of mobile applications can be a significant obstacle to mobile learning (Dolzich et al., 2021; Kaharova and Jo'rayeva, 2022) and internet technologies (Ziyaev and Aliyeva, 2022) when learning a foreign language.

Summing up the results of the study, it should be noted that its results and conclusions can be considered and used by foreign language teachers in higher education when introducing mobile learning into the educational process.

## Conclusion

The implementation of mobile learning methods in learning a foreign language provides the opportunity to activate students' independent activity, increases their cognitive activity, and contributes to the individualization of learning. The use of mobile technologies provides teachers with additional options to facilitate students' learning. Moreover, mobile devices allow teachers to make the educational process more productive and assess students' progress. Smart devices can provide unique

opportunities for students to practice the language through a variety of mobile applications and communication with other people.

This study aimed to investigate the understanding of mobile foreign language learning among second-year philology students. The results of the study confirmed the hypothesis that various aspects (individual factors) of mobile learning affect both the perceived satisfaction of students in learning a foreign language and their perception of the usefulness of mobile learning and performance.

Nevertheless, the study has certain limitations. The study sample was limited to one University. Therefore, the results of the study cannot be fully generalized. The study considered only the impact of some aspects of mobile learning on academic performance, perceived satisfaction, and perceived usefulness of mobile learning. Thus, future research using other characteristics is proposed.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required for this

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study in accordance with the national legislation and the institutional requirements.

## Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2022.946102/full#supplementary-material>



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