

ORGANIZATION OF MOBILE LEARNING AS A INNOVATION TECHNOLOGY IN EDUCATION

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Abstract

The authors, taking mobile learning as a promising vector of digital pedagogy, describe the advantages of using mobile learning technologies in the process of organizing the educational process and revealing the content of their mobile applications in the educational process. The article discusses the directions of using mobile learning in modern education, as well as the organization of mobile learning as an innovative technology in pedagogy. Today, mobile learning is a rapidly developing and promising area in education. Mobile technologies have made learning more flexible. It is noted that despite the wide distribution and availability of mobile phones among students, mobile learning is poorly distributed in domestic universities. It is concluded that the capabilities of mobile devices are constantly growing and they can be widely used as educational tools and take center stage in education.

Keywords: mobile learning, interactive learning environment, mobile applications, pedagogical research, higher education, teaching method.

Аңдатпа

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МОБИЛЬДІ ОҚЫТУДЫ БІЛІМ БЕРУДЕГІ ИННОВАЦИЯЛЫҚ ТЕХНОЛОГИЯ РЕТІНДЕ ҰЙЫМДАСТЫРУ

Авторлар мобильді оқытуды сандық педагогиканың перспективалық векторы ретінде алып, оқу процесін ұйымдастыру барысында мобильді оқыту технологияларын пайдаланудың артықшылықтарын сипаттайды және білім беру үдерісіндегі мобильді қосымшаларының мазмұнын ашады. Мақалада қазіргі білім беруде мобильді оқытуды қолдану бағыттары, сонымен қатар педагогикадағы жаңа технология ретінде мобильді оқытуды ұйымдастыру қарастырылады. Бүгінгі таңда мобильді оқыту - бұл білім беруде қарқынды дамып келе жатқан перспективалы бағыт. Мобильді технологиялар оқытуды икемді етеді. Студенттер арасында ұялы телефондардың кең таралуы мен қол жетімділігіне қарамастан, отандық жоғары оқу орындарында мобильді оқыту жай таралып жатқандығы атап көрсетілген. Мобильді құрылғылардың мүмкіндіктері үнемі өсіп, оларды оқу құралы ретінде кеңінен қолдануға болады және ол білім беруде басты орын алады деген қорытынды жасалды.

Түйін сөздер: мобильді оқыту, интерактивті оқыту ортасы, мобильді қосымшалар, педагогикалық зерттеулер, жоғары білім, оқыту әдісі.

Аннотация

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ОРГАНИЗАЦИЯ МОБИЛЬНОГО ОБУЧЕНИЯ КАК ИННОВАЦИОННАЯ ТЕХНОЛОГИЯ В ОБРАЗОВАНИИ

Авторы, взяв мобильное обучение в качестве перспективного вектора цифровой педагогики, описывают преимущества использования мобильных технологий обучения в процессе организации учебного процесса и раскрывают содержание своих мобильных приложений в образовательном процессе. В статье рассматриваются направления использования мобильного обучения в современном образовании, а также организация мобильного обучения как новой технологии в педагогике. На сегодняшний день мобильное обучение является быстро развивающимся и перспективным направлением в образовании. Мобильные технологии сделали обучение более гибким. Отмечается, что несмотря на широкое распространение и доступность мобильных телефонов среди студентов, мобильное обучение слабо распространено в отечественных вузах. Делается вывод, что возможности мобильных устройств постоянно растут и они могут широко использоваться в качестве образовательных инструментов и занять центральное место образования.

Ключевые слова: мобильное обучение, интерактивная среда обучения, мобильные приложения, педагогические исследования, высшее образование, метод обучения.

Introduction

The state program for the development of education and science in the Republic of Kazakhstan for 2020-2025 states that "work on the development of digital infrastructure (wireless communications, cloud technologies, microservices, computers, and peripheral equipment, local area network, broadband internet access, etc.) of educational organizations will continue" [1].

The use of digital technologies in activities at any level of education is the only guarantee of access to quality education. This is also shown by world experience in developed countries. In this regard, the purpose of education today has also changed. This goal is not only for any young generation to learn and achieve the necessary competencies, but also for the formation of an individual who can perform the necessary activities, have a professional and social reputation, find and effectively use the necessary information, have a well-developed personality, correctly assess their own and others' activities, make a significant contribution to the social and economic development of the country [2].

The importance of the development of education at any level in the country, the relevance of its social responsibility – is justified by the ability to acquire the necessary knowledge and use it in practice. High success in the development of education can be achieved only through the effective use of innovative technologies and new teaching methods.

Time itself has proven that the continuous desire to create innovative technologies and equipment, no matter what industry it is, makes great strides in comparison with the existing ones so far. As practice shows, when a new technology appears, its potential is not fully manifested, that is, it is not immediately clear to all members of society. Similarly, the possibilities of mobile technologies have not yet been fully disclosed. It has been proven over time that we can consider it as one of the innovations that have the ability to change and update the existing values. In a short time, mobile technologies have contributed to the rapid and high-quality implementation of human needs, as well as an increase in the quality of human life.

Today, mobile technology is of particular importance in all areas of human activity. The growth of demand for mobile technologies in the conditions of the global market proves the relevance, necessity, and efficiency of its activities.

In the field of education, innovative technologies such as distance education, mass open online courses, video conferences and webinars, electronic and digital educational resources, and mobile learning contribute to improving the quality of education to a new level. One of them is mobile technologies – the only technology that allows you to use new methods of teaching, on the basis of which it provides an effective way to learn.

In modern times, it is impossible to imagine the life of humanity without these mobile devices. The intensive dissemination of information through mobile devices has led to a multiple increase in the number of users of mobile devices.

Mobile learning has grown exponentially in recent years, coinciding not just with the rise of smartphones and handheld devices, but also the level of dependency individuals place on the technology. According to Marketing Land, 65% of all digital media is viewed on smartphones. According to DScout, the average person spends nearly three hours on their smartphone each day, touching the screen more than 2,600 times and glancing at it roughly 221 times. With these numbers in mind, it's no surprise that learning has found a niche market in the mobile world. According to Report Linker, the global mobile learning market will hit over US 78.5 billion by 2025.

The possibilities and prospects of mobile learning are studied in detail in the works of foreign scientists. In particular, Turkish scientists Abdulvahap Sonmez, Lütfiye Gocmez, Derya Uygu and Murat Ataizi reviewed the literature on mobile technologies and analyzed the state of its research and development directions in the article [3]. It highlighted the various definitions of mobile technologies, their differences from e-learning, and highlighted its advantages and difficulties.

Mobile learning is a technology in education that facilitates the work of teachers, expands capabilities, strengthens the depth of knowledge, and is considered as an auxiliary tool in addition to the main form of learning [4].

Thus, mobile learning is a technological tool that organizes communication between the proposed knowledge and its user. Mobile Learning makes sense only if the technology used is fully mobile and the users of the technology are mobile during the training period. These findings give the meaning of learning mobility and the term "mobile learning" [5].

The authors Matthew L. Bernackia, Jeffrey A. Greenea, Helen Crompton [6] of the article consider the role of mobile technology and its achievements in mobile technologies and education. Articles by Camilleri M.A., Camilleri A.C. [7] examined preparation for learning with mobile applications.

Mobile learning opens the way to a new quality in educational activities and allows you to quickly access information at any time. First of all, you need a mobile device to participate in mobile learning and you need to change your mobile device frequently to take advantage of the achievements of innovation technologies. Currently, various mobile devices are widely used in education: smartphones, mp3 players, tablets, laptop computers and audio devices. Modern students are used to using smartphones and spend most of their time doing this every day.

Research methodology

Currently, Mobile Learning is very relevant, on the one hand, it is a new form of learning, and on the other hand, it is convenient for practical use. The programs Platonus, Zoom, Google Classroom, Obs Studio, Screen Cast, etc. are widely used in teaching at the distance learning stage in higher education institutions. Each of these programs has its own characteristics for distance learning teachers. Teachers record video lessons using these programs and use them in online lessons. These programs are accessible to students, convenient for self-education purposes, and convenient for feedback.

Therefore, the use of mobile technologies in education is not a problem for students and it is convenient for them to provide educational material in a mobile version.

According to UNESCO research, the advantages of using mobile devices in education over other technologies are as follows:

- *Mobility*. Mobile devices allow to organize the learning process from anywhere, regardless of time. There are two aspects of mobility: first, it can provide education in a place where teachers are physically unable to move in real time, and second, modern technologies, especially cloud data storage systems can carry out education without being dependent on any device. Even if the user changes their mobile phone, it is possible to access training materials through cloud storage. Students can also learn through an online forum and chat.

- *Continuity of education*. Projects in the field of mobile education in comparison with information technologies are continuous and have unlimited access to technology for students. Mobile devices are always close to the person and make the educational process continuous: students can complete a given task at any time they want.

- *Personalization of knowledge*. Mobile devices help students choose their own level of difficulty of tasks and accept it in a convenient way. That is, the creators of educational programs for mobile purposes use various information: text, graphics, and video materials. Mobile devices are used for self-assessment of results to consolidate the topic.

- *Improving the quality of communication*. Mobile devices can quickly and efficiently establish good relationship and feedback between students and teachers. In addition, innovative technologies can be effectively used in education, providing high-quality support for training in any format. Mobile tools create a convenient and accessible, interesting learning method for students [8].

The teacher's activities aimed at ensuring the quality of education can be divided into three main components:

1. Content (What should be taught?) - mastering new educational programs, participation in projects of different levels, content selection;

2. Action-Based (how to train?)- introduction of modern educational technologies, including ICT;

3. Procedural (how to organize pedagogical interaction?) - determining the conditions and ways to achieve pedagogical goals.

In providing the teacher's activities described above, you can use a large number of available sets of mobile learning technologies. In the implementation of projects for the introduction of mobile learning technologies in education, the didactic capabilities of various mobile devices: smartphones, mp3 players, tablets and audio tools began to be studied and optimized for education [9].

Smartphones and tablets are mobile devices equipped with a touch screen, a Wi-Fi module that provides internet access, a camera, a sound sensor (microphone), a GPS sensor and operating systems for installing various applications. The use of smartphones, tablets and other mobile digital devices as didactic resources in education at universities gives very effective results.

In general, in order to be able to effectively use mobile technologies in education, teachers must possess the following knowledge:

- know how to use smart technologies in conducting subject, interdisciplinary and special courses;
- ability to critically select smart technologies in education;

- knowledge of what knowledge and skills students should master to carry out educational personal development activities, the level of need for smart technologies to achieve this goal;
- students should know new methods of assessing their knowledge, skills and abilities.

Along with many advantages, the use of mobile learning in education has its own difficulties and disadvantages. These include the following issues:

1. Technical issues:

- small screen and keyboard size on mobile devices;
- the problem of internet addiction;
- availability of a monthly payment to the mobile provider;
- mobile devices only work with power supply;
- limited memory capacity;
- information security issues;
- lack of a single standard for mobile platforms and devices;
- risk of losing mobile device.

2. Social and educational issues:

- not all students have the opportunity to purchase the appropriate mobile devices;
- occurrence of problems related to the assessment of educational results;
- issues related to the security of educational content;
- very fast development of mobile technology;
- unpreparedness of pedagogical theory due to mobile learning;
- conceptual difference between e-learning and mobile learning;
- issues related to the security of personal information;

In general, as the scale of mobile application use increases in practice, the relationship between teacher and student decreases. That is, this form of education slows down relationships, trust, leadership, the ability to work in a team, etc.

The use of mobile technologies allows for the following positive changes in the learning process:

- does not create the need to create computer classes using special funds;
- gives the teacher freedom of choice to provide students with online applications, depending on the need and specifics of the application;
- provides dynamic learning as it does not depend on a specific location;
- during the discussion and exchange of electronic educational material by students, the role of the teacher is transferred from the narrator of knowledge to the guide, organizer of Education and Manager;
- coordinates and connects formal and informal learning;
- the student's appeal to mobile devices to receive the necessary information contributes to the fact that he is constantly on the lookout and continues his education;
- creates conditions for lifelong education and career growth of a person.

In addition to the fact that mobile learning is used as an additional form of e-learning in our country, the reasons why it is still not fully used at the required level [10]:

1. Insufficient quality educational content and a small number of necessary prerequisites for its implementation.
2. Lack of a unified system used for mass education.
3. High cost of network communication services.

However, all these problems can be solved by an in-depth study of the possibilities of mobile learning in education.

According to John Traxler, the following categories of mobile learning are distinguished [11]:

- Technology-driven mobile learning - some specific technological innovations are placed in an academic setting to demonstrate technical feasibility and pedagogical capabilities.
 - Miniature but portable eLearning - mobile, wireless, and portable technologies are used to replicate approaches and solutions that are already used in conventional electronic learning tools. For example, the migration of some e-learning technologies, such as virtual learning environment (VLE), to these technologies, or, for example, the flexible replacement of static desktop technologies with mobile technologies.
 - Connected classroom learning - the same technologies are used in the classroom to support collaborative learning, possibly in connection with other technologies in the classroom, such as interactive whiteboards.

Informal, personalized, situational mobile learning - the same technologies are enhanced with additional functionality, such as local awareness or video transmission, and are aimed at educational activities that would otherwise be difficult or impossible.

Mobile training/performance support - technologies are used to improve the productivity and efficiency of mobile employees, providing information and support, just in time and in the context of their immediate priorities.

Remote /rural/ developing mobile technologies are used to address the environmental and infrastructural challenges provided to education and support it where conventional e-learning technologies would not work, which has often been accepted in developing or evolutionary paradigms.

Considering specific forms and methods of implementing mobile technologies in the educational process, it should be mentioned following points:

1. A mobile phone provides Internet access to sites with training information and is used as a form of distance learning. The first and most common method is to use a mobile phone as a means of accessing the global network. It is possible to organize access to specialized websites containing electronic training courses, tests, practical tasks and additional training materials (drawings, photos, audio and video files). It is also possible to exchange e-mail for educational purposes and exchange instant messages in ICQ and QIP programs, versions of which also exist for mobile phones. Thus, at all stages of training, there are many opportunities for transmitting information materials to the student, as well as monitoring the entire learning process and helping to solve emerging problems.

2. A mobile phone is a means of playing audio, text, video, and image files containing training information.

The second possible way to use mobile phones for training is to use special programs for mobile phone platforms that can open and view files of office programs, such as Word, Power Point. Thus, having such files containing training information in the mobile phone memory, you can view their versions adapted specifically for the phone screen, with convenient scroll bars, a suitable font, and a user-friendly interface.

Also, the source of information can be video and audio files, programs-players for which are available in every phone of the last years of release. This opportunity is especially valuable for those who want to learn foreign languages – there are a huge number of audio courses and audiobooks available, including files of different formats and lengths.

An example of the successful application of this method of teaching is several educational programs at universities in Japan and China. Considering mobile technologies, teachers at these universities consider them very promising in the conditions of informatization of modern society.

The National Cyber Institute in Japan, which specializes in distance learning via the Internet, has proposed an innovative system of training. Using a mobile phone, which allows you to study any discipline, both at home and in a cafe or in the subway. If the text of the lecture and all the necessary drawings are shown in the center of the screen on the computer during the lesson, and a video recording of the lecture itself is broadcast in the corner, then the mobile phone version is based on video streaming technology, and all texts and drawings are downloaded additionally.

3. The mobile phone and its functionality allow you to organize training using adapted electronic textbooks, training courses, and specialized types of files with training information – training manuals are developed directly for mobile phone platforms. Another way to use mobile phones for teaching is to use specialized electronic textbooks and courses adapted for viewing and performing on students' mobile phones. Students are invited to download Java applications to their phones, which contain, for example, tests in certain subjects, as well as information (electronic textbooks, lecture texts) necessary for their successful implementation. Modern technologies make it quite easy to design and implement such electronic manuals programmatically. The ability to place diagrams, drawings, and formulas makes writing e-learning courses for mobile phones universal and applicable to absolutely any subject being studied. It is also possible to implement training programs in the game shell, using the graphics capabilities of phones, but the implementation of such applications is a rather complex and time-consuming process. As a result, writing electronic textbooks and subject testing programs for mobile phones seems to be a more prospective direction. There are a huge number of special applications for mobile phones, such as calculators of varying degrees of complexity (simple, scientific), office programs for mobile phones, applications containing different tests with answers (for example, for psychologists), etc.

The current generation of students has grown up using mobile phones. It is based on the results of the conducted research. Based on the Comscore study, the majority of mobile phone supporters, namely 77%, are users between the ages of 18 and 34. It also found that users between the ages of 13 and 24 are the most active

audience of mobile apps. In this way, we can conclude that mobile learning will be fully implemented among students.

In one of the studies conducted by foreign scientists aimed at determining the effectiveness of using mobile phones in teaching, the majority of the 106 students (87,74 %) primarily use their mobile phones to make calls, 80,19% to listen to music, and 74,53% to study. Despite the high rating of students' use of mobile devices in teaching, it has been found that teachers rarely offer effective learning applications [12].

Currently, there are about 2.5 million apps in the iOS App Store and Google Play, of which about 200 thousand are dedicated to education. According to research conducted by Statista (www.statista.com), as of June 2021, among the available applications in the Apple App Store, educational applications are in third place, the share of which is 8.67%. It was found that 52.1% of the total audience downloads educational apps.

In their works, S. Bimasheva, Sh.G. Iskakova and A.A. Shibintaeva try to identify the current state and prospects of using mobile technologies in teaching a foreign language by reviewing research. Based on the results of the study, empirical studies conducted in modern Australia, China, Iran, Turkey, Saudi Arabia, Cyprus, Japan, Malaysia, Spain, Taiwan, and other countries have concluded that in most cases the use of mobile technologies in teaching foreign languages gives a positive result due to a number of advantages of mobile devices compared to classical pedagogical tools [13].

Results and discussion

In the process of organizing mobile learning as an innovative technology in education, the research work covered the stages of identification, development, and formation.

At the identification stage, the state of mobile learning tools used in education was determined. In this regard, the purpose and scientific forecast of the study were determined.

At the development stage, the principles of operation of technical equipment used in mobile training were considered. Further, the didactic opportunities of mobile technologies in the development of education were studied.

At the stage of formation, the relevance of mobile learning technologies to pedagogical activity was studied.

In the course of the work, we conducted a survey to determine students' understanding of mobile learning. The survey also aims to study and analyze the crucial factors to overcome possible gaps in the use of mobile learning in higher education.

The questionnaire is a methodological form of research, which is the collection of data using structured questionnaires filled out by respondents. In the context of the experiment, the questionnaire can be used as one of the tools for data collection. Here are a few key aspects of the survey as a methodological form of experiment:

Purposefulness: The questions in the questionnaire are formulated in such a way as to get specific and targeted answers from respondents.

Objective data: The survey allows you to collect quantitative data, which provides the possibility of statistical analysis and obtaining objective conclusions.

Scalability: This method allows you to collect information from a large number of participants, which makes it scalable.

Anonymity and confidentiality: Questionnaires are often anonymous, which contributes to more open responses, especially on sensitive topics.

Saving time and resources: Conducting a survey can be an effective way to collect data from a large number of participants in a short period.

The questionnaire as a methodological form of experiment provides researchers with a powerful tool for collecting qualitative data, providing important practical research opportunities.

Our survey involved students of 1-4 courses of Korkyt Ata Kyzylorda University, studying in the specialty 6B01517 - Biology. 8 questionnaires were developed to measure students' assessment of the effectiveness of mobile learning. The questionnaire consisted of the following questions:

1. Mobile learning can be an effective way to learn, as it can provide instant support.
2. Mobile learning opens new learning opportunities.
3. Mobile learning becomes a flexible way to learn, as it can be learned anytime and anywhere.
4. Mobile learning improves student-teacher communication.
5. Mobile learning is a quick way to get feedback in the learning process.
6. Mobile learning cannot be used for learning:
7. Lack of mobile phones in most students.

8. Costs associated with mobile training.
9. Poor communication quality.

The answers were measured on the Lincert scale of up to five points with categorical consent: in the range from "completely agree" to "completely disagree", a score above 3.0 indicates relative importance. The total number of respondents was 176 people. Age and gender were not taken into account during the survey. Google Forms was used as a survey tool. The questionnaires were collected at the end of the semester in May 2021. During this training period, a mixed training format was conducted in accordance with the quarantine situation in the country. Descriptive statistics on the effectiveness of mobile learning based on the results of the study are shown in Table 1 and diagrams (Fig. 1-5).

Table 1. Descriptive statistics on the effectiveness of mobile learning

№	Survey indicators	Totally agree	Agree	Neutral	Disagree	Completely disagree	Total
1	Mobile learning can be an effective way to learn, as it can provide instant support diagram 1.	50	75	28	21	2	176
2	Mobile learning opens new learning opportunities diagram 2.	64	86	21	5	-	176
3	Mobile learning becomes a flexible way to learn, as it can be learned anytime and anywhere diagram 3.	97	75	4	-	-	176
4	Mobile learning improves student-teacher communication diagram4.	10	28	51	54	33	176
5	Mobile learning is a quick way to get feedback in the learning process diagram 5.	68	57	24	26	1	176
<i>Mobile learning cannot be used for learning</i>							
1	Lack of mobile phones in most students.	91	71	10	4	-	176
2	Costs associated with mobile training.	81	71	19	4	1	176
3	Poor communication quality.	73	61	23	13	5	176

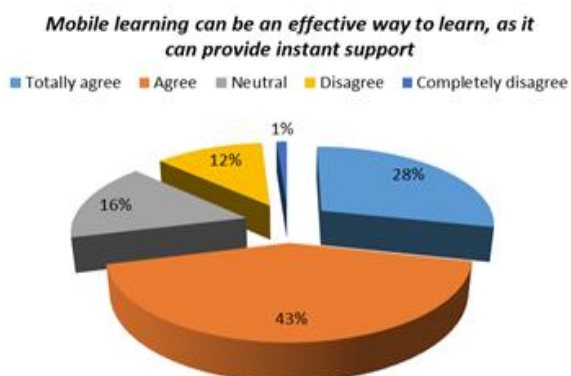


Fig. 1. Mobile learning can be an effective way to learn, as it can provide instant support

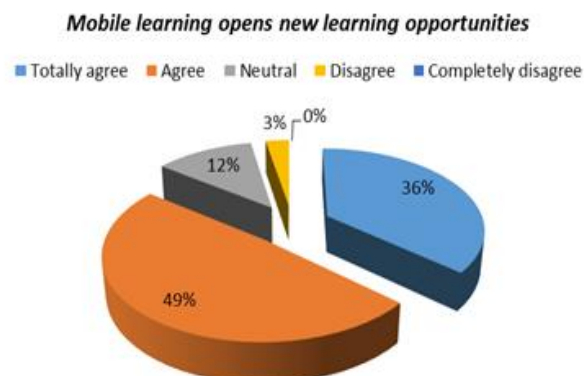


Fig. 2. Mobile learning opens new learning opportunities

Mobile learning becomes a flexible way to learn, as it can be learned anytime and anywhere

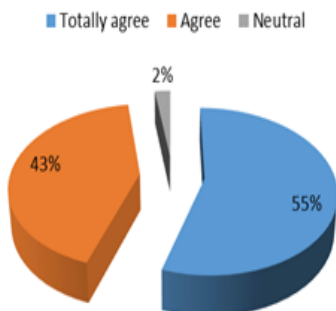


Fig. 3. Mobile learning becomes a flexible way to learn, as it can be learned anytime and anywhere

Mobile learning improves student-teacher communication

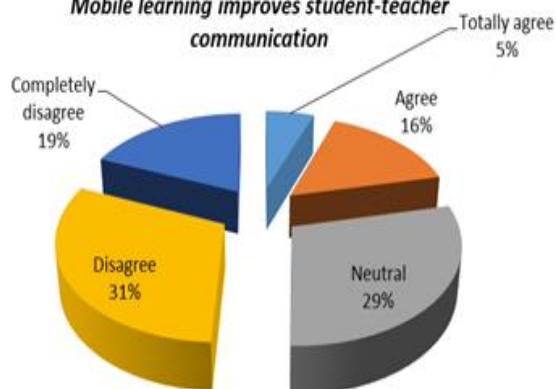


Fig. 4. Mobile learning improves student-teacher communication

Mobile learning is a quick way to get feedback in the learning process

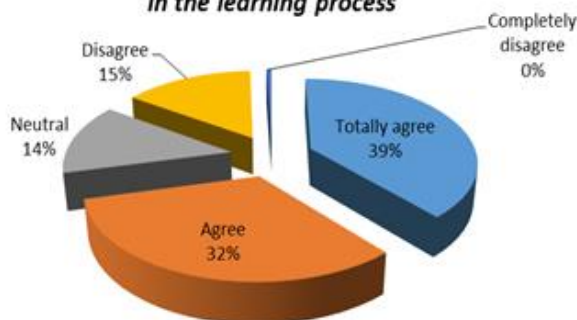


Fig. 5. Mobile learning is a quick way to get feedback in the learning process

From the diagrams, we can see the relative importance of the indicators, and according to the table, we can see that more than 70% of these respondents support mobile learning as an effective method of learning. The study shows that students are attracted by the ease of use of mobile learning. The survey also found that poor communication and learning costs were important barriers for students. Although mobile learning is chosen as a quick way to get feedback in the learning process, they have expressed that they do not see it as a tool to improve communication between students and teacher. As a result, we can conclude that mobile learning can be an effective method of learning.

Conclusion

Summing up, the use of mobile technologies accelerates the learning process, increases students' interest in the subject, teaches self-education, and strengthens the relationship between the teacher and the student in the learning process. Currently, mobile learning is a new direction in education.

The evolution of technology and the development of mobile applications in the last few years, especially for higher education, have been nothing short of spectacular. The flexibility, cost benefits, and effectiveness of mobile learning further hold great potential for the future.

Mobile learning is an innovative and promising technology. It allows the student to create, receive, or provide educational information in any format, significantly expanding the educational resources and educational environment of educational institutions [14].

It is known that the idea of mobile learning arose from the goal of making the most of the educational opportunities offered by mobile technologies. The mobile learning method allows students to learn at any time and place using the resources available to them. It also allows students to realize their needs for study and search in several educational institutions. Such opportunities influenced the emergence of a whole system of innovative teaching methods [15].

Mobile learning in education comes up with a distinct approach that helps address several of the common educational issues seen in other traditional modes of learning. The evolving technological landscape and tools have set the stage for learning that can harness the speed and ubiquity of digital capability.

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