Motivation for Mobile Learning: Teacher Engagement and Built-In Mechanisms

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Abstract—The relevance of the study of mobile learning as an upcoming trend in education in the context of the COVID-19 pandemic is not denied. The study of students' ability and motivation to use modern technologies of mobile learning is characterized by novelty. However, the problematic issue of studying the motivation of students and teachers for mobile learning in today's pandemic remains relevant. The purpose of the study is to examine some aspects of the formation of students' motivation (intrinsic motivation: interest in the subject of study, understanding of its significance for further career; extrinsic motivation: points, awards, recognition), as well as the role of teachers in this process and the influence of cognitive abilities of a person on their motivation and academic achievement. The study is based on the method of experiment as well as the interviews and analysis of student reports. There were 185 students (19–22 years old) from Sechenov First Moscow State Medical University and Far Eastern Federal University participating in the study. After the participants had listened to an online lecture on the topic "Neuro-linguistic programming", they were asked to make a report on the topic of the same name and expand the information. Next, the students were interviewed. The results showed that 89% of students were interested in the issue and 69% noted a desire to learn more information on this topic; 100% of participants actively use mobile devices with Internet access for educational purposes and, in particular, for making the required report. However, only 12% of respondents believe that mobile learning alone can be used in order to study specialized disciplines at their university. Thus, 43% of students find it difficult to perceive information from the screen of a smartphone (tablet); 61% of students prefer traditional education to mobile learning, which is probably due to the novelty of this process; 65% of respondents noticed that their knowledge is deteriorating due to the use of mobile (distance) learning. In connection with the results obtained, the following recommendations were made to improve the educational process: to explain to students the importance and usefulness of the topic under study; to use adequate pedagogical methods in the context of mobile learning; to provide feedback and the ability to communicate to students during mobile learning; to take into account the personality and learning style

of a student; to use all types of intrinsic and extrinsic motivation of students in accordance with specific circumstances. The most popular motivation factors for mobile learning are possibility of improving exam grades (65%), possibility of improving knowledge (25%), and broadening horizons and deep interest in the topic (10%). Developing applications that will take into account the needs of a particular university and specialty will also make a contribution. Teachers are also encouraged to use a play-based approach and a student reward system in order to increase the level of motivation (additional points, a simplified exam scheme, etc.). The practical significance and prospects for further research are presented by the opportunities of increasing students' motivation in the context of mobile learning, and, consequently, the success of their studies. The results can be used in the comparative study of mobile learning possibilities in modern conditions and teachers' involvement in it in different countries.

Keywords—cognitive abilities and distance learning, intrinsic and extrinsic motivation, methods of increasing interest in learning, mobile learning, student interest in learning, teacher motivation

1 Introduction

Today mobile learning is gaining increasing popularity all over the world. The e-learning industry has grown by 900% since 2000. Mobile learning proved to be effective for 90% of K-12 students in 2019 [1]. Researchers are actively studying various aspects associated with its use: pedagogical (selection of suitable pedagogical methods) [2]; psychological: easy refocusing, problems with concentration [3]; physiological: negative effects on vision [4], etc. Some of the most important factors that determine the effectiveness of mobile learning are the skills and positive intentions of teachers regarding mobile learning, as well as student motivation [5].

Motivation can be defined as the sum of incentives that positively influence the choice of a particular behavior or goal. Demotivation, as an opposite concept, is broadly defined as various negative influences that eliminate motivation, and more specifically as external forces that weaken or diminish the motivational basis of behavior, intention or current action [6].

Mobile learning provides great advantages to learners, for example:

- easy access to mobile devices and the Internet;
- relatively low cost of gadgets and communication services;
- more adapted learning to the needs of a specific audience;
- comfort for students;
- the possibility of constant communication between a teacher and a student, which is not limited by the presence in the educational institution, as well as between students;
- the possibility of quick self-assessment due to the availability of various materials for self-examination in mobile applications and courses: tests, quizzes, etc. [7].

Like any other form of learning, mobile learning has its drawbacks. These include application bugs, the risk of distraction as a gadget can be used for purposes other than

learning, namely, blurring the lines between personal use of a gadget and learning. However, there is no doubt that mobile learning has enormous potential [7].

Today mobile devices have unique characteristics: portability and mobility, flexibility, convenience, remote access, ease of use [8]. This makes it possible to take the educational process to a new level and make it independent of place and time. Besides, mobile learning is available to a larger range of people compared to traditional learning; personal presence and other circumstances do not play a role [5].

The research is devoted to the study of methods of motivating medical students to engage in mobile learning (including built-in mechanisms) and teachers' influence on the effectiveness of this process. The research is a contribution to the study of various aspects (pedagogical, psychological, etc.) associated with mobile learning and is aimed at studying the influence of the combination of these factors on the productivity of mobile learning.

1.1 Literature review

The concept of mobile learning. Mobile learning is a type of learning that involves mobile technology to provide learners with learning materials, guidance, or support [9]. Mobile learning is not limited to physical locations [10]. It also gives students the opportunity to schedule classes.

The rapid advances in neuroscience and the interdisciplinary collaboration between neuroscience and psychology provide valuable insights for understanding the dynamic and hidden nature of human motivation by identifying the neural mechanism of motivation [11]. One of the fundamental questions in the neurobiology of motivation is what neural mechanisms underlie the direction, intensity, and control of motivation and subsequent actions. There are 13 key brain structures associated with motivation and 3 key neural circuits focused on motivation, namely: reward circuit, value-based decision-making pathway, and regulation/self-control circuit [11].

In terms of nursing education, the use of mobile technology has advanced significantly over the past decades [10]. Today, almost 100% of students have mobile devices and actively use educational applications especially during the COVID-19 pandemic [12]. Moreover, the pandemic has intensified the use of various modern technologies, including mobile learning [13]. It was also found that mobile learning was mainly applied to teaching basic nursing concepts and skills, as well as teaching long-term care, obstetrics and gynecology. However, several widespread mobile learning strategies such as query-based learning, contextual mobile learning, synchronous sharing, Mindtools, project-based learning and peer-to-peer assessment have rarely been used in mobile nursing education [10].

Research shows that the majority of students used mobile devices for accessing various social networks, recreation and entertainment [14]. The small screen size, entertainment, and privacy aspect prevented them from participating in formal learning activities with the same frequency as they did for entertainment purposes. Notably, clinical science and nursing students had similar perceptions and behavior, and tended to have more varied information needs. On the other hand, Chinese respondents

studying medicine were not as active in their use of mobile devices for learning as the other two majors [14].

Mobile learning provides students with motivation that is not achieved through distance learning or e-learning. Mobility and other features (weight, size, and privacy) make this type of learning more motivating. Another aspect that makes mobile learning motivating is the element related to play and fun (gamification) [15]. A playful approach provokes students' interest and excitement, a sense of competition, which will increase their involvement in the process. Non-formal learning is also an important element, it attracts interest and stimulates learners' imagination. The learning process occurs in the interaction of cognitive and motivational variables, which are inseparable. Student motivation, intrinsic or extrinsic, has a significant impact on academic performance [16].

Students are enthusiastic about the use of additional learning tools (mobile learning) [17]. Students feel encouraged and motivated to use mobile apps; in particular they are attracted by the simple language of the apps. Mobile learning has a positive effect on their psychological state (reduces stress levels, creates a feeling of comfort, does not overload schedule) [17].

Challenges in mobile learning. There is a problem of easy students' refocusing from learning to entertaining content, which they can access via mobile devices. Omani students who participated in the study used their mobile devices to use complex applications. Learning applications such as how-to guides and reference tools were used much less. The barriers included screen size, cost, limited memory, and battery. The benefits were time savings, ease of access and use. Some students (14%) identified the lack of technical support as a problem [3].

Mobile applications exist as an assistive technology and are not intended to replace the lecturer or to shape the learning process; they are a step in the planned process. This relates to the involvement of educators who provide assistance as needed in the process [18].

Despite the widespread application of mobile learning in the world, there are still locations where the population access to gadgets and the Internet is limited [19]. Thus, the introduction of web-based learning (WBL) in the teaching and learning process is a big problem for many institutions in Uganda and other developing countries (India, Nigeria, Pakistan, etc.). It is recommended to provide access to high-speed Internet, establish technical support, and allocate budgetary funds [20].

In Russia, where this study was conducted, the majority of university students (about 99%) have mobile devices that can be used in mobile learning. Among the shortcomings, obsolete gadgets (without 4G support) and problems with Internet access or its poor speed can be noted. However, this is not a significant handicap. This allows one to talk about the possibility of widespread introduction of mobile learning in education in the coming years.

1.2 Setting objectives

This research is aimed at studying the ways and possibilities of motivating students to effective mobile learning, as well as the role of teachers in the process and

the peculiarities of human cognitive abilities. The objectives of this study include studying various aspects of student motivation and its types, improving the forms of teachers' participation in the process, studying the features of students' cognitive functions, as well as developing recommendations for educational process management.

2 Methods and materials

2.1 Research design and sample

The study is based on the method of experiment as well as the interviews and analysis of student reports. This type of study was also conducted by other scientists, for example, Zeynali et al. [6]. The study involved 185 students (19–22 years old) from Sechenov First Moscow State Medical University (Faculty of Medicine, Faculty of Preventive Medicine, Faculty of Pediatrics) and Far Eastern Federal University. Most of the participants (99) were 21–22 years old male students (107). Eighty-six participants were female. There were 78 participants aged 19–20. The majority of respondents had both a smartphone and a tablet. None of the students used a laptop or a netbook during lectures (Table 1).

Table 1. Sample characteristics

Gender	Male	99
	Female	86
Age	19–20	78
	21–22	107
University	Sechenov First Moscow State Medical University	109
	Far Eastern Federal University	76
Availability of mobile devices	Smartphone	18
	Tablet	13
	Smartphone + Tablet	154

2.2 Survey

The students were invited to a lecture on the topic "Neuro-linguistic programming" given by 4 teachers from Sechenov First Moscow State Medical University. Information and invitation leaflets were handed out in the university. The lecture was held online on the Zoom platform and the students listened to it on their mobile devices (mainly smartphones). The lecture was introductory and lasted 90 minutes. After that, the participants had to make a report on the topic of the same name (1300–1500 words) expanding the information with their own conclusions (not only what the teachers said). Next, 4 teachers checked the reports and analyzed them in order to find out whether the learners had introduced new information on the issue. The report had to be written

within 5 days after the lecture. Then the students were interviewed. The interview was conducted in the university classroom individually with each student (5–10 minutes). The selection of this type of research was due to the fact that it allows the respondents not only to answer the questions, but also to substantiate their responses and express an opinion. Key interview questions:

1. Was the topic of the lecture interesting?
2. Have you had any interest in this matter before?
3. How would you rate the presentation of information by the teachers?
4. Was it easy to perceive information from the screen of a smartphone (tablet)?
5. Has the lecture sparked your interest in this topic?
6. Where did you find additional information to make the report?
7. Do you often use mobile devices to find information for your studies?
8. Do you think it is possible to study core disciplines at your university with the help of mobile learning?
9. Do you prefer mobile learning or traditional learning?
10. Has your knowledge improved (deteriorated) after applying mobile (distance) learning?

2.3 Data analysis

The SONY ICDPX470 recorder was used for recording students' responses, which were transcribed into a Word document. Initially, respondents were interviewed, and all answers were recorded on a dictaphone and then translated into text format. The text was analyzed with the help of special programs, based on which tables and diagrams were formed.

2.4 Statistical processing

The data were studied and analyzed, including with the help of the SPSS software. All answers were relevant to the interview topic.

2.5 Ethical issues

Before the beginning of the study, the participants were informed about the topic, procedure, and objectives of the research. They also signed an informed consent document. The reports' content and interview results were not disclosed.

2.6 Research limitations

The study results are reliable; however, it should be noted that the study was conducted only in 2 universities in Russia and the number of participants was limited.

3 Results and discussion

3.1 Results of students' reports

After checking the students' reports, it was found that 82% of participants had introduced new information. The main source of information was the Internet. Of these, 65% of students added more than 50% of new information in the report, which means that most students can easily use mobile devices to successfully search for the information they need on the Internet; 6 students who performed the best were asked (during interviews) about their motivation for the thorough approach to work. According to the results obtained, 4 students were interested in the further positive effect of the activity on their exam grade, and 2 people said that the topic was very interesting for them.

3.2 Interview results

The survey results show such examples of students' answers to interview questions as (Table 2):

Student 1: "The topic was interesting for me because I think that it is relevant today. I was not specifically interested in this issue, but I heard a lot about it. I am positive about mobile learning, but it is important that the teaching methods are suitable for this type of learning. I used Google to search for the information needed to make the report. Recently, due to the COVID-19 pandemic, distance learning has become commonplace, but I am more comfortable with the information received in the university classroom. I believe that specialized disciplines cannot be studied at a medical university through mobile learning alone."

Student 2: "The lecture was interesting, I have been interested in this issue for a long time. I have a positive attitude towards mobile learning, it is easy and does not depend on location and time. Nevertheless, I cannot say that this contributes to my knowledge. Rather the opposite. It was interesting to listen to the teachers, but there was a little lack of live communication. I looked for the information on the Internet. I am not sure that one can become a doctor learning exclusively through mobile learning. It would be nice to combine mobile and traditional learning."

Student 3: "I have not been interested in this topic, but it is well known. The lecture was interesting, but sometimes a little boring. I liked the availability of a number of graphs, tables and diagrams. I used the Internet to make the report. I like the idea of mobile learning, although it does not have a positive effect on knowledge. Despite the fact that I try to listen to online lectures carefully, I still often get distracted. This makes a good contribution to learning specialized subjects in a medical university, but it cannot be the main type of learning."

Student 4: "It is not very easy for me to perceive information from a smartphone screen. In general, the teachers' lecture was interesting, but it was difficult to remember the information. I used Google and YouTube to make the report. After the lecture, there was a desire to learn more on this topic, especially given its relevance today. I have

good visual memory, so the visuals were very helpful. At our university, it would be feasible to use mobile learning to study non-core subjects. To study specialized disciplines, personal presence and the ability to communicate are required."

Table 2. Summary of student responses to the key interview questions

1	Was the topic of the lecture interesting?	Interesting 89%	Not interesting 11%
2	Have you had any interest in this matter before?	Yes 74%	No 26%
3	How would you rate the presentation of information by the teachers?	Good 68%	Poor 32%
4	Was it easy to perceive information from the screen of a smartphone (tablet)?	Easy 57%	Difficult 43%
5	Has the lecture sparked your interest in this topic?	Yes 69%	No 31%
6	Where did you find additional information to make the report?	on the Internet 100%	
7	Do you often use mobile devices to find information for your studies?	Yes 93%	No 7%
8	Do you think it is possible to study core disciplines at your university with the help of mobile learning?	Yes 12%	No 88%
9	Do you prefer mobile learning or traditional learning?	Mobile 39%	Traditional 61%
10	Has your knowledge improved (deteriorated) after applying mobile (distance) learning?	Improved 35%*	Deteriorated 65%*

Note: *This result did not contradict students' assessments.

The obtained results show that 89% of participants found the topic interesting and 74% dealt with this topic before; 68% of respondents gave a positive assessment to the teachers' presentation of information, which means that traditional pedagogical methods are not always suitable for mobile learning. To improve the quality of teaching, it is necessary to organize teacher training and motivate them to self-develop (allocation of time, fringe benefits).

Forty-three per cent of learners found it difficult to perceive information from the screen of a smartphone (tablet). Mobile learning is new to most people so this form of presentation is unusual. Learners may also feel uncomfortable; for example, they may experience problems with their eyes. Each person should find a solution to the problem themselves (use a gadget with a larger display size, adjust brightness, sound, etc.).

After listening to the lecture, 69% of students got interested in the topic and had a desire to learn more about it. This demonstrates a positive impact of mobile learning on motivation to learn.

All students used the Internet to find additional information; 93% of students often search the Internet for the information they need. This suggests that the Internet provides numerous opportunities for learning, the only problem can be the lack of motivation to learn.

At the same time, 88% of students believe that specialized disciplines cannot be studied through mobile learning alone at a medical university. In this case, the use of

blended learning (mobile and traditional) can be recommended. A fairly large number of students (39%) today prefer mobile learning to traditional learning. This percentage is likely to grow in the coming years. Only 35% of respondents believe that their knowledge has improved after mobile learning. This figure is also expected to grow as mobile learning is introduced into the education process.

3.3 Factors affecting participants' motivation

According to the interviews, the main factors affecting students' motivation were possibility of improving exam grades (65%), possibility of improving knowledge (25%) and broadening horizons and deep interest in the topic (10%) (Table 3):

Table 3. Motivation factors

Possibility of improving exam grades	65%
Possibility of improving knowledge and broadening horizons	25%
Deep interest in the topic	10%

Based on the above, it can be concluded that extrinsic motivation of students prevails over intrinsic. While intrinsic motivation is preferable, extrinsic motivation (reward) can also work well during university studies.

According to the research participants, mobile learning is associated with a number of distractions (entertainment content, calls, messages, instant messengers, etc.). Students also lack live communication with teachers and peers, as well as feedback on the results of their studies. When students use a mobile learning app, the learning environment becomes complex, and a number of barriers that distract students occur. According to another study, feedback has become one of the important factors determining user satisfaction. Developers should provide adaptive content or feedback in accordance with different user models, as well as an appropriate learning assessment to help students understand the learning process and its outcomes [21].

New finding in the present research is the study of students' motivation for mobile learning, the conclusions of which are made directly on the basis of respondents' answers to questions. The study of various aspects of mobile learning and student motivation using the method of experiment through interviews provided an opportunity to bring new knowledge in the field of mobile learning research. Students can use the following (or similar) applications to plan and track their learning outcomes: Sechenov University Tests, Brainly, Quizlet, XMind tests (Table 4). The advantages of Sechenov University Tests are presented by a big range of tests, different subjects and high quality exam preparation. The disadvantages of this application are connected with some bugs (slow operation, no response when selecting answer options). Application Brainly has the following advantages: it helps to find answers to various scientific questions; it has convenient design; it allows users to take training and exams of various companies (Google, IBM). No disadvantages have been found in this application. Apps for parents: Oshkola, Norton Family parental control, etc. Such applications are usually available in English so they can be used both in Russia and in other countries.

Table 4. Examples of student applications and their characteristics

Sechenov University Tests	Advantages: a big range of tests, different subjects, high quality exam preparation
	Disadvantages: There are some bugs (slow operation, no response when selecting answer options)
Brainly	Advantages: Helps to find answers to various scientific questions, convenient design, allows users to take training and exams of various companies (Google, IBM)
	Disadvantages: not found

There are a number of benefits of mobile learning for teachers and students (Figure 1). Instant student feedback is thought to focus on students' weaknesses, reduce misunderstandings, and improve learning. Teachers can identify student misconceptions and problems, adapt instruction, improve assessment and feedback, and enhance the quality of instruction.

The use of mobile technologies at the university	
⇩	
Instant feedback	
Students	- a focus on learners' weaknesses
	- reduction of misunderstanding
	- improved training
Teachers	- can identify students' misconceptions and challenges
	- can adapt teaching
	- improved assessment process and feedback
	- improved teaching

Fig. 1. Benefits of mobile learning for teachers and students
Source: Own development based on the data obtained by Khaddage et al. [22].

In medical education, mobile learning can be introduced in the core curriculum to study a number of subjects. It has been observed that a smartphone can have a positive impact on the process of learning anatomy. There are numerous reports on the negative effects of mobile phone abuse and high rates of addiction among young people (musculoskeletal symptoms, decreased vision, communication difficulties, sleep problems, etc.) [23,24]. Moreover, these conditions are notably associated with diseases such as depression, anxiety, sleep disorders, and behavioral changes. On the other hand, there is a growing body of research on the positive effects of smartphones on learning (medical advice, disease awareness, and patient care). Thus, a smartphone is considered to be an

effective tool to facilitate the learning process. When studying anatomy and other disciplines, additional tools such as modeling, quizzes, and board games can be helpful [25].

In modern life, knowledge should be constantly updated and mobile learning serves as a tool for self-education. Indian researchers found that 52.2% of students used a deep learning approach and 11.1% of learners relied on a surface learning approach; 80% of students have a positive attitude towards mobile learning and 76.7% of students realize its importance; 52.2% of students were actively involved in the m-learning group and 57.8% of students did not download general reference materials (at least twice a week). Thirty-eight point nine percent of students never read and/or answered questions asked, and 60.0% of students never asked any questions related to the discussion. The results showed that there were no statistically significant differences between student attitudes and perceptions (mean scores) of mobile phone use in education based on gender [26]. In the present study, there was no significant difference in the results related to the gender of the participants. Students are also aware of the importance of mobile learning, but the results (success, grades) show that it is quite superficial.

An important task of educators is to motivate students to learn. According to Canadian scientists, over the past decade, there have been great advances in researching the cognitive processes involved in mobile learning. This is due to a better study of how the brain works, which became possible due to technological advances in medicine; and today there is a problem with the practical application of the data. In comparison to these results, the present data analysis is characterized by the indications of students' motivation influenced by the mobile learning: possibility of improving exam grades (65%), possibility of improving knowledge (25%) and broadening horizons and deep interest in the topic (10%). Teachers, as well as many students, adhere to traditional learning styles and are reluctant to implement changes in their lives. In order to eliminate the problem, it is necessary to work on the awareness of teachers and students involved in mobile learning (training, benefits, allocation of time, etc.). Intrinsic motivation to learn includes the following elements: challenge, curiosity, control. Extrinsic motivation to learn implies cooperation, competition, recognition. According to researchers, motivation can be enhanced through challenge, curiosity, control, competition, and cooperation [27]. Intrinsic motivation is preferable as it provides better results. However, in the practice of university teachers, extrinsic motivation also occupies an important place mainly because students are part of the team and competition, and recognition and good grades are important for them.

Many participants in the present study noted that the use of mobile learning is unusual for them. Habits have the greatest impact on students' intentions to switch to mobile learning. Consistent use of mobile learning can be encouraged through the processes aimed at nurturing students' habits when using a mobile learning system as a tool to complete tasks [28]. Regular use of mobile learning will make it more familiar and comfortable for students.

The pedagogical methods used by educators are not always suitable for mobile learning environments. At the same time, a teacher is the determining factor for the learning success. The main responsibilities of a teacher are to qualitatively present the material and motivate students. The results obtained by the researchers from Turkey showed that students highly appreciate ease of use, perceived usefulness, autonomy of learning, intent, and perceived self-efficacy in relation to mobile devices and mobile

learning. However, according to students, many teachers are not yet ready to apply mobile learning. This study demonstrated that students find mobile learning to be simple and rewarding. They have a positive attitude towards mobile learning. In everyday life, they use a lot of mobile applications for academic purposes [29].

Those students who are not comfortable with the use of smartphones in the process of mobile learning can use large-screen gadgets such as tablets, netbooks, and laptops. According to British researchers, netbooks have been an effective complementary learning tool that significantly expands student knowledge and understanding [30]. The advantage of netbooks is that they have a larger screen compared to smartphones or tablets, and at the same time are quite compact. This contributes to more comfortable learning.

A positive attitude of teachers towards mobile learning and the intention to apply it are a prerequisite for successful learning. A teacher's perceived ease of use of mobile technologies is directly related to the actual application of this type of learning (if a teacher has difficulties using technology, s/he often avoids it); a teacher's disposition is positively associated with a teacher's perceived ease of use, psychological well-being (the desire to use technology makes it easier to learn to use it) and the perceived usefulness of mobile learning [31].

To increase the motivation of students to study a particular topic, it is necessary to develop the ways to encourage them. One of the options is to explain to students the benefits of the material being studied and the possibilities of its application. American researchers have identified strategies that increase motivation to learn before students are asked to study the content (for example, explanation of the usefulness of the course material for the career). The authors assume that studying any course material can provoke a desire to learn more; this is in line with the notion that the learning process itself can generate curiosity and interest. Through the study conducted among students, the researchers found that watching TED Talk videos (i.e., familiarizing with new information, learning) related to any topic increased motivation to continue learning that topic and other topics in general [32].

The effectiveness of mobile learning depends on the personality traits of students. Thus, students with a high level of anxiety or depression may perceive the educational material worse due to a decrease in energy level, drowsiness, pessimism, lack of interest in life and other symptoms that negatively affect the learning process. It is also necessary to consider the learning style and preferences of a student. Indian researchers classified eight different attributes of student learning qualities based on the National Center for Biotechnology Information (NCBI) e-learning database: anxiety, personality, learning style, cognitive style, previous semester grades, motivation, learning level, and prior knowledge [22].

It can be summed up that mobile applications' development should be in line with the needs of a particular university and specialty. Motivational elements can be added to applications (for example, accumulation of points which have a positive effect on further grades). A play-based approach and a student reward system can be used in order to increase the level of motivation (additional points, a simplified exam scheme, etc.). This can be implemented both in traditional and mobile learning environments (for example, in mobile applications).

4 Conclusions

The results of this study showed that today all students actively use mobile devices for educational purposes. In the process of mobile learning, a teacher and his/her ability to work in the mobile learning environment are of great importance. The intention of teachers to work with new technologies and the formation of their teaching skills in the new environment can significantly improve the effectiveness of mobile learning. Thirty-two percent of the study participants reported that they were not satisfied with the teaching process. Nevertheless, after the lecture, 69% of students noted their willingness to more deeply study the topic. This confirms the fact that the learning process contributes to the emergence of interest in new information.

The quality of mobile learning also depends on the personal characteristics of a student. For example, depression can interfere with the effective assimilation of information. A playful approach to learning can make many students interested in their studies. Consideration of the mechanisms determined by the human nature will increase motivation to learn. These include interest in reward, recognition of students' values and the possibility of regulation/self-control. The majority of respondents (88%) noted that they do not believe that studying specialized disciplines at a medical university through mobile learning alone can be successfully implemented. In this regard, it should be combined with traditional learning (for example, 30%/70%).

In order to increase student motivation, it is recommended to take into account motivation factors when developing an online curriculum, as well as mobile applications that should be focused on the specifics of a particular university. Such factors may include the accumulation of points, the reward system, the gamification of the process, etc. This research is a contribution to the study of various aspects of mobile learning from the perspective of pedagogy, psychology and physiology. The study will be of interest to teachers, students, parents, psychologists, as well as to a wide range of people interested in modern education. The practical significance of this study lies in the consideration of opportunities to increase students' motivation and, consequently, their academic success in the context of mobile learning. The study results can be used in the comparative study of the possibilities of mobile learning in modern conditions and the involvement of teachers in it in different countries. Further research could focus on a more thorough exploration of the built-in mechanisms (reward scheme, value-based decision-making pathway, and regulation/self-control network) that are associated with student motivation.

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