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## MOBILE LEARNING IN THE IMPLEMENTATION OF EDUCATIONAL PROGRAMS FOR TRAINING AT THE TERTIARY LEVEL: THE NATIONAL ASPECT

МОБІЛЬНЕ НАВЧАННЯ В РЕАЛІЗАЦІЇ ОСВІТНІХ ПРОГРАМ ПІДГОТОВКИ  
ЗДОБУВАЧІВ ВИЩОЇ ОСВІТИ: НАЦІОНАЛЬНИЙ АСПЕКТ

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**Mobile learning in the implementation of educational programs for training at the tertiary level: The national aspect**  
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**ABSTRACT**

The **purpose** is to diagnose the psychological and technical readiness of first-year bachelor's degree students for mobile learning and, based on the results, to create a roadmap for the organisation of mobile learning in the process of training first-year bachelor's degree students.

**Methodology.** The study was conducted on the basis of H.S. Skovoroda Kharkiv National Pedagogical University in several stages and included the identification of the theoretical foundations of the study, the selection of methods and techniques of mobile learning, and the research base.

The survey involved 189 respondents who are full-time undergraduate students, including women (93.7%) and men (6.3%). The students who took part in the survey are studying in the following faculties: Primary Education; H.F. Kvitka-Osnovianenko Ukrainian Language and Literature; Preschool Education; Natural Sciences; and Law. The project was carried out using a descriptive method by filling in a specially designed questionnaire, the Mobile Microlearning Online Questionnaire.

**Results.** The advantages of mobile learning for higher education students are: efficient use of time, individual pace and rhythm of learning. At the same time, difficulties in the experience of mobile learning are caused by the inability to rationally distinguish between rest, study, and intellectual leisure. In addition, difficulties are also caused by problematic concentration of attention, inability to rationally spend time and energy resources, the problem of the availability of the current generation of gadgets; lack of experience in teamwork, delegation of authority, gaps in secure communication via MS, lack of quality communication, difficulty in mastering computer programs, heavy workload and volume of tasks, lack of digital competence of teachers.

Students consider freedom of movement, the extent of participation in learning initiatives,

**Мета роботи** – діагностика психологічної та технічної готовності здобувачів першого бакалаврського рівня до мобільного навчання та на основі отриманих результатів створення дорожньої карти організації мобільного навчання у процесі підготовки здобувачів першого бакалаврського рівня вищої освіти.

**Методологія.** Дослідження проводилось бази Харківського національного педагогічного університету імені Г. С. Сковороди у декілька етапів та передбачало виявлення теоретичних основ дослідження, вибір методик і методів мобільного навчання, бази дослідження.

В опитуванні взяли участь 189 респондентів, які є здобувачами денної форми навчання освітнього рівню «бакалавр», з них жінки (93,7%) та чоловіки (6,3%). Здобувачі вищої освіти, які взяли участь у проведенні анкетування, навчаються на таких факультетах: початкове навчання; український мовно-літературний імені Г.Ф. Квітки-Оснoв'яненка; дошкільна освіта; природничий; юридичний. Для реалізації проєкту було застосовано описовий метод шляхом заповнення учасниками спеціально розробленої анкети під назвою онлайн-анкета «Мобільне мікронавчання».

**Результати.** Перевагами мобільного навчання для здобувачів вищої освіти є: ефективна витрата часу, індивідуальний темп та ритм навчання. Водночас, утруднення у досвіді мобільного навчання зумовлені невмінням раціонально розмежовувати відпочинок, навчання, інтелектуальне дозвілля. Крім того, труднощі викликані й проблематичною концентрацією уваги, невмінням раціонально витратити ресурси часу і сил, проблемою наявності сучасного покоління гаджетів; відсутністю досвіду роботи у команді, делегуванням повноважень, прогалинами у безпечному спілкуванні засобами РС, відсутністю якісного зв'язку, складністю опанування комп'ютерних програм, великим навантаженням та обсягом виконання завдань, відсутністю цифрової компетентності викладачів.

Важливими умовами ефективності мобільного навчання здобувачі вважають

*prompt communication between participants, the environment for the formation of information and digital literacy, clear step-by-step instructions, and dynamic communication to be important conditions for the effectiveness of mobile learning.*

*In mobile learning, higher education students most often use a smartphone and a laptop, less often other devices (such as UMPC; Tablet PC; tablet PCs; e-book; audio player; multimedia guide; multimedia consoles, etc.) to search for information on the Internet, set up video communication, such as a camera, a voice recorder, to watch videos, and to translate.*

**Conclusions.** *The study substantiates the need to take into account the technical and psychological readiness, and the competence in the use of mobile devices of first-year bachelor's degree students in the use of mobile devices for mobile learning. A roadmap for the organisation of mobile learning in higher pedagogical education institutions has been developed and presented.*

**Keywords:** *academic integrity, digitalisation, distance education, mobile learning, time management.*

*свободу руху, міри участі у навчальних ініціативах, оперативність зв'язку учасників навчання, середовище формування інформаційно-цифрової грамотності, чіткі покрокові інструкції, динамічне спілкування.*

*У мобільному навчанні здобувачі вищої освіти найчастіше використовують смартфон та ноутбук, рідше інші пристрої (UMPC; Tablet PC; планшетний PC; електронна книга; аудіопрогравач; мультимедійний путівник; мультимедійна консоль тощо), з метою пошуку інформації в мережі Інтернет, налаштування відео зв'язку, а також як камеру, диктофон для перегляду відео, здійснення перекладу.*

**Висновки.** *У дослідженні обґрунтовано необхідність врахування технічної та психологічної готовності, компетентності у використанні мобільних пристроїв здобувачів першого бакалаврського рівня до мобільного навчання. Розроблено та представлено дорожню карту з організації мобільного навчання в закладах вищої педагогічної освіти.*

**Ключові слова:** *академічна доброчесність, цифровізація, дистанційна освіта, мобільне навчання, тайм менеджмент.*

## INTRODUCTION

Intensive informatization and digitization of all spheres of life in modern society necessitates the radical modernization of higher education based on the active use of innovative computer technologies. It should be noted that due to the forced circumstances associated with the COVID-19 coronavirus pandemic since March 2020, and later with the introduction of martial law due to the intensification of military aggression by the Russian Federation since February 2022, most national institutions of higher education switched to a mixed and remote form of training, with the wide use of various services, platforms, and online resources.

It is obvious that the distance and mixed format of learning have become the leading forms of obtaining education in universities and the provision of educational services has moved to an electronic format. It is safe to say that the introduction of mobile learning is the trend of learning for the current and future generations.

One of the promising ways to solve this problem is the implementation of mobile learning to increase the efficiency of the educational process and optimize the provision of educational services. At the same time, teachers face a particularly acute problem of implementing mobile learning in educational programs for the preparation of applicants for the first-year bachelor's degree level of higher education.

In the conditions of rapid digitization, 80% of the world's population currently use smartphones. They do not just use their mobile phones; they are attached to them. Almost 90% of the population always has their smartphone nearby. It goes without

saying that the easiest way to “reach” prospective students and get their attention is with a device they use all the time.

For example, modern scientific research shows that mobile learning increases productivity by up to 43%, while learners complete courses 45% faster than those who learn using a computer. Much of this is due to the features used in mobile learning, such as micro-learning modules and gamification. Collapsing large amounts of information into chunks makes learning quick and painless, and adding interactive elements like quizzes and leader boards helps engage students and keep them motivated.

Better yet, having access to small packets of information when they need it makes learning a habit rather than a routine. Learners can pick up their phones, do a 2-3-minute class, and then go right back to what they were doing. This means that learning can become part of their existing workflow and users will immediately see its value, leading to increased teacher motivation.

Mobile learning is also beneficial from a business perspective. More than half of business leaders see improved growth after implementing mobile learning in the training of their employees, because it not only increases productivity, but also increases their length of service. Research by LinkedIn shows that 94% of employees would stay with their company longer if it invested in their professional development.

The demand for mobile learning in institutions of higher education is an obvious fact, but it remains a partially solved problem, which is due to the need to find appropriate mechanisms for its implementation in the process of training applicants, in particular, identifying their psychological, technical, and organizational readiness for mobile learning.

We will consider the organization of mobile learning in the context of ensuring the quality of education, which we understand to be a multifactorial complex phenomenon that involves the consistent formation of competencies and professional awareness of an individual in the practice of educational communication in a specific educational institution.

The quality of education, we emphasize here, involves the specification of the level of achievement of expected learning outcomes by graduates of a higher education institution, appropriate internal support systems, monitoring, and external expertise. These meta-components designed to understand the key concept of mobile learning, which involves the practical implementation of the principles of partnership pedagogy, the implementation of competence-based and personal approaches, including through the spread of constructive practices and author's approaches.

The problem of implementing mobile learning in institutions of higher education has been developed in the works of both domestic and foreign scientists. Thus, V. Gurevich, M. Kademiya, and L. Shevchenko (2012) revealed the essence of mobile learning, which consists in transferring knowledge to a mobile device using WAP or GPRS technologies in order to make the learning process flexible, accessible and personalized.

Researcher S.O. Vorontsov (2021, p. 102) provided a scientific and practical substantiation of the effectiveness of the process of involving mobile devices under the control of the Android or iOS operating systems for the performance of traditional tasks performed with the help of a computer was carried out, which allows an increase in the level of success of applicants, to develop their interest in the study of information technologies.

In the research of O. Alekseeva, T. Malandii, and D. Trebukhov (2021), modern trends in the use of mobile devices to test control of knowledge were considered, and an analysis of the market of software products intended for creating mobile applications was carried out. The authors took the level of computer literacy as the basis of the analysis, and defined the competencies of mobile device designers as follows: the presence of professional programming skills, optional knowledge of programming languages, and the development of design skills based on the web interface.

The authors O. Kanivets, I. Kanivets, N. Kononets, T. Gorda (2020) revealed the problem of implementing mobile learning of students within the framework of the implementation of the concept of resource-based learning in higher education. Based on the research analysis, it was concluded that mobile learning is interpreted as a form of resource-oriented learning and is considered as a system of organizational and didactic activities based on the use of mobile information and communication technologies and mobile pedagogical software tools.

It is noted that one of the directions of implementation of the concept of resource-oriented education in higher education is the development of such mobile pedagogical software tools that will make it possible to improve the quality of professional training of specialists, in particular, technical specialties (Kanivets et al., 2020).

Scientific works by M. Azizizi, E. Razsai, and M.S. Bagheri (2020) are devoted to the understanding of mobile learning by Iranian students learning English as a foreign language (EFL) by investigating the impact of various aspects of this concept on student satisfaction, as well as on the perceived usefulness of mobile learning. Moreover, this study aims to examine the impact of student satisfaction and perceived usefulness of mobile learning on their success in the EFL classroom.

Psychological aspects of the use of mobile learning in the context of ensuring the quality of education are presented by K. Demir and E. Akpınar (2018). When developing the materials of this study, we relied on the conclusions about the influence of mobile learning on the development of critical thinking of students, presented by M. Khagparast, F. Nasaruddin, and N. Abdullah (2014). The technological potential of using mobile learning was considered by M. Struk and S. Semirikov (2015), O. Krivoruchko and M. Kostiuk (2018).

Therefore, in the publications of the researchers, only certain aspects of the outlined problem are thoroughly considered, but the issue of psychological and technical readiness of applicants for mobile learning and the creation of an algorithm for its implementation in the context of quality assurance in higher education institutions remains unresolved.

It is appropriate to note that in foreign and national scientific literature, innovative concepts-equivalents are used in relation to education, which involves the use of online technologies, in particular, such as: "teaching at a distance", "dialogue learning", "resource-based learning", "network learning", "continuous learning", "lifelong learning", "virtual learning", "flexible learning", "Web-based learning/training", "computer-based training", "Internet-learning/training" (Sobchenko 2021, p. 95).

The concept of learning using small portable computers was developed by Alan Kay in 1972. Following this early concept, Traxler, Sharples, and Soloway became the first

scholars to pave the way for a better understanding of the philosophical, pedagogical, and conceptual foundations of mobile learning today. Kay started with the initial idea of a portable learning device. Traxler, Sharples, and colleagues explored new theoretical frameworks for mobile learning to provide a better understanding of the field.

In the context of the global importance of the quality of education, we consider mobile learning in this study as a purposeful special organization of educational communication using different contexts of social, cultural, scientific and other types of content using the software of available personal electronic devices (tablet, smartphone).

Of course, mobile learning has more significant prospects under the condition of using the potential of content on the Internet. In this case, the coordination of such educational communication is greatly simplified through the setting up of mobile applications, social communication networks, channels, virtual platforms, or online communities.

The advantages of mobile learning include the simplicity of the organizational aspect, free open access, and the possibility of processing educational content asynchronously and indirectly. It is this advantage that we see as a perspective in the implementation of the idea of ensuring the quality of education through the expansion of the possibilities of the organization of mobile learning in the implementation of the individual educational trajectory of the student, the implementation of the practices of dual education, and the formation of lifelong learning competence.

## **METHODOLOGY**

The research was carried out in several stages and included the identification of the theoretical foundations of the research, the selection of methods and methods of mobile learning, and the research base. The organization of mobile learning in institutions of higher education is a complex multifactorial process that requires coordinated actions of the administration of the educational institution, teachers, and students. The implementation of mobile learning technologies requires the organizers to perform certain tasks:

1. Determination of the role and place of mobile technologies in the educational process. Mobile devices can be used in any way: both in the audience and outside it; both as a mandatory element of the course and as an additional option. In addition, in some cases, mobile learning can be an alternative to traditional learning.
2. Selection of a strategy for providing students with portable devices. For example, the concept of BYOD (bring your own device). This is most consistent with the name of mobile learning (getting knowledge anytime and anywhere).
3. Assessment of students' readiness for mobile learning. Before starting the implementation of mobile learning, it is necessary to assess the technical equipment and competence of students, as well as their psychological readiness. For this, a questionnaire was conducted, based on the results of which a decision can be made regarding the implementation of mobile learning.
4. Development of road maps and checklists for the use of mobile learning in the implementation of educational programs or the individual educational trajectory of a student of higher education.

5. Current monitoring and analysis of the level of psychological and technical readiness of applicants of the first-year bachelor's degree level of higher education for mobile learning for a systematic update of technology or a road map for the use of mobile learning.

A survey of the attitudes of students to mobile learning was conducted with students of H. S. Skovoroda Kharkiv National Pedagogical University. For this, an online questionnaire "Mobile micro-learning" was created in a Google form [<https://forms.gle/e5e9gHRabG9uJNws6>]. The results are saved to Google Drive.

The purpose of the questionnaire is to identify the technical and psychological readiness of students for mobile learning and to determine the relevance, advantages and disadvantages of the specified type of training.

The questionnaire contained 14 questions that required multiple-choice answers.

1. Name of the faculty.
2. Sex.
3. Course.
4. Form of education.
5. Choose two advantages of mobile learning at your discretion (interactive interaction with the teacher; interactive communication in a virtual group; effective use of time; individual pace, rhythm of learning; possibility of operational statistical analysis of content, learning methods, assessment results; other).
6. Determine the nature of the difficulties that you had to face in the practice of mobile learning (I have not yet learned to rationally spend resources of time and energy; I have not learned to distinguish between rest, study, and intellectual leisure; I have gaps in safe communication by means of MS; I have to learn to concentrate; I have learned to delegate authority, work in a team; the problem of having the latest devices; other).
7. Micro-learning is (learning for young people; learning in small parts; learning for a short time; learning small parts of the content of the discipline, quick actions, simple operations; other)
8. Choose the two most important conditions for the effectiveness of mobile learning for you (the new role of the teacher-coordinator; clear step-by-step instructions; dynamic communication; the efficiency of the communication of the participants of the study; freedom of movement, measures of participation in educational initiatives; the environment for the formation of information and digital literacy; other).
9. What devices do you use in mobile learning? (UMPC; Tablet PC; tablet PCs; laptop; PDA; e-book; smartphone; audio player; multimedia guide; multimedia consoles; other).
10. Which mobile applications are more convenient for you? (Zoom; Google Meet; Social Networks; WhatsApp; Viber; Telegram other).

11. Mark the functions of mobile devices that you use for learning (to search for information on the Internet; to watch videos; as a camera; as a voice recorder; as a translator; as a video communication; other).
12. From which educational portals or resources did you receive assignments from the teacher? (Moodle platform; Telegram; Viber; by e-mail; link to virtual disk; link to cloud storage; other).
13. How long can you be without a mobile phone/smartphone? (More than 1 hour; More than 3 hours; More than 6 hours; Day; Week; Month, and other).
14. Rate the quality of distance learning at the university (from 1 to 5, 5 is the maximum).

The authors of the article took part in the development of materials of methodical recommendations, didactic material from such educational disciplines as “General pedagogy”, “Pedagogy”, “Providing educational technologies”, and “Coaching technologies in education”, and created courses on the Moodle distance platform.

## RESULTS

A total of 189 respondents took part in the survey, who are full-time bachelor's degree students, among them women (93.7%) and men (6.3%). The respondents study at the following faculties: elementary education (24.9%); H.F. Kvitka-Osnovianenko Ukrainian Language and Literature (24.3%); preschool education (24.3%); natural sciences (17.5%); law (9%).

The obtained data made it possible to assess the level of psychological (questions 5-8, 14) and technical (questions 9-13) readiness of students for mobile learning.

The results of the answers indicate that the priority advantages of mobile learning for those seeking higher education are: effective use of time (63.3%), individual pace, rhythm of learning (56.1%). This allows us to conclude that mobile learning provides an opportunity to allocate time rationally and efficiently, since educational materials are available at any time and in any place.

It is also flexible, as students can choose their own pace and rhythm of learning according to their individual characteristics and capabilities. The following advantages were also highlighted: the possibility of operational statistical analysis of the content of the material (34.4%), interactive interaction with the teacher (33.9%), interactive communication in a virtual group (17.5%), economical use of time and money (0, 5%).

To define what difficulties the applicants faced in the practice of mobile learning, a question containing both a multiple-choice answer and an opportunity to provide one's own option, i.e. an expanded answer, was proposed. Thus, the obtained results indicate that current students of higher education have certain subjective and objective difficulties in the experience of mobile learning, which must be taken into account and solved by teachers for the further organization of the specified type of education.

These main difficulties are: inability to rationally distinguish between rest, study, and intellectual leisure (41.3%); problematic concentration of attention – 34.9%; inability to rationally spend resources of time and energy – 33.9%; the problem of having the latest generation of gadgets – 19.6%; lack of experience working in a team, delegation of authority – 13.8%.

The respondents also mentioned gaps in safe communication by means of PCs, lack of high-quality communication, difficulty in mastering computer programs, a much greater workload in contrast to traditional training, a large number of tasks to complete, and lack of digital competence of teachers.

It should be noted that only three among the 189 respondents surveyed, had no problems in the practice of mobile learning, which indicates the imperfection of the organization of the specified type of training and the lack of a developed didactic system for mobile training of applicants in higher education institutions.

Regarding the respondents' understanding of the concept of "micro-learning", we have the following results:

Micro-learning is...

- training for young people – 9%;
- learning in small parts – 14.8%;
- short-term training – 26.5%;
- teaching small parts of the content of the discipline, quick actions, simple operations – 48.1%;
- other (studying at a certain university, studying together) – 1.6%.

From this, it can be concluded that students have a somewhat superficial knowledge of understanding the specified type of education. This shows that micro-learning, although it is currently an educational trend, is only beginning to gain popularity and demand in the educational process.

The following important conditions for the effectiveness of mobile learning were determined by the respondents:

- freedom of movement, measures of participation in educational initiatives – 55%;
- communication efficiency of training participants – 36%;
- the environment for the formation of information and digital literacy – 36%;
- clear step-by-step instructions – 33.3%;
- dynamic communication – 29.6%;
- the new role of teacher-coordinator – 11.1%.

The obtained results indicate that the priority conditions for effective mobile learning for the younger generation are freedom of movement, efficiency, dynamism, the formation of information and digital literacy, which is fully connected with the requirements of a digital society.

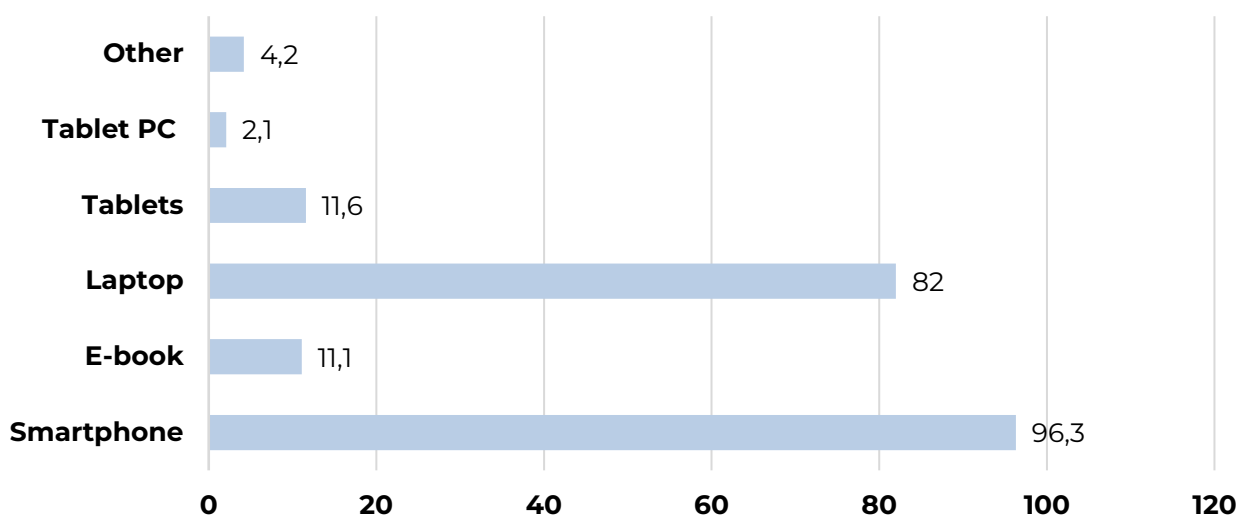
Regarding the technical readiness of students for mobile learning, the following results were obtained. In mobile learning, students of higher education most often use a smartphone (96.3%) and a laptop (82%), less often other devices (such as UMPC; Tablet PC; tablet PCs; e-book; audio player; multimedia guide; multimedia consoles.). The results of the survey are presented in Fig. 1.

In turn, mobile devices are used for learning with the following functions: how to search for information on the Internet – 95.2%; for setting up video communication – 89.9%, as a

camera – 70.9%, as a voice recorder – 22.2%; for watching videos – 61.4%; for translation – 52.4%.

**Figure 1**

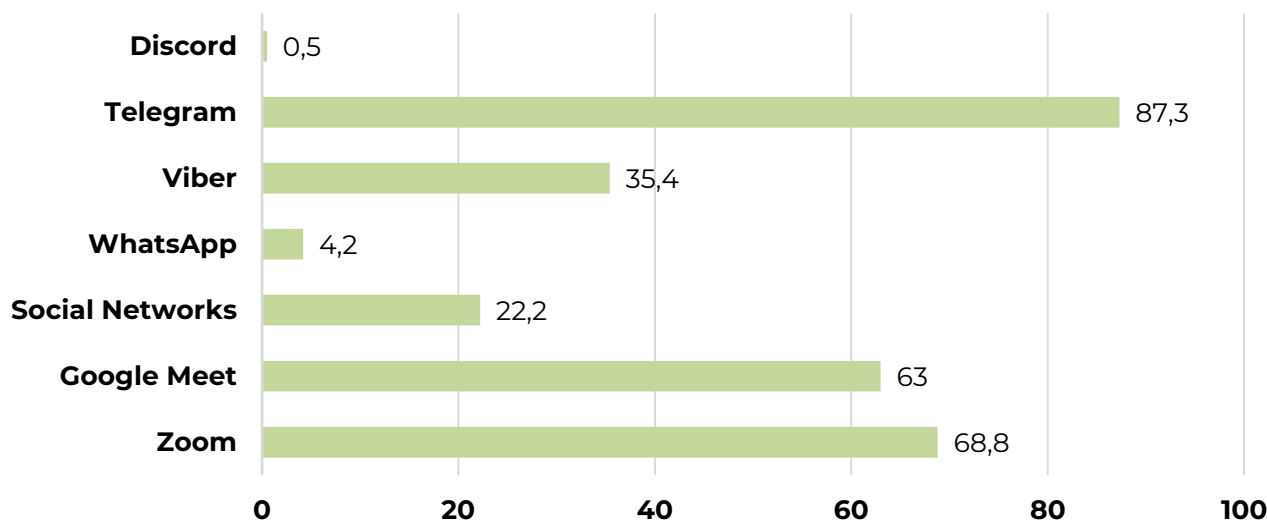
*What devices do you use in mobile learning?*



Mobile learning involves the use of computer programs, digital and cloud services, applications for organizing video conferences, online consultations, transfer of educational content, conducting various types of monitoring of educational and cognitive activities, and feedback. In order to identify convenient and popular mobile applications in the organization of the specified type of training for their further study and use, the questionnaire contained questions of the nature presented in Fig. 2.

**Figure 2**

*Which mobile applications are more convenient for you?*



The most convenient applications were Telegram, Zoom, and Google Meet, Viber, social networks, and more. The mentioned mobile applications are free and easy to use since although they have an English interface, it is intuitive. There are currently a large number of applications that are used to organize mobile learning, but it is enough to master a limited number of services, applications, platforms and thoroughly study their functions and opportunities for active and effective use.

In light of this, it was established that most often applicants received educational information, step-by-step instructions, and tasks for independent work through the following services and platforms:

- Moodle remote platform – 98.9%;
- e-mail – 66.7%; Viber – 64.6%;
- Telegram – 53.4%;
- virtual disk – 11.1%;
- cloud storage - 2.6%;
- Google Classroom – 0.5%.

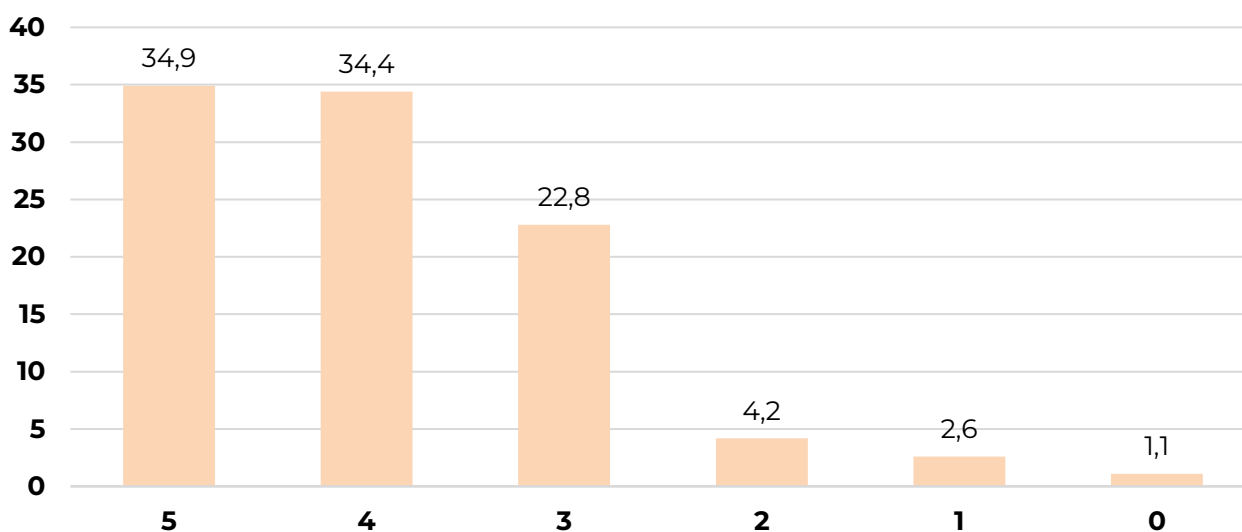
It was established that modern youth can do without a mobile phone/smartphone for a maximum of half a day - 24.3%, more than 3 hours - 21.2%, more than 1 hour - 21.2%.

It should also be noted that the presence of feedback is a necessary component of mobile learning, which ensures effective dynamic communication. However, only a third of respondents defined this condition. Mobile learning implies a significant change in the role of the teacher, because from the transformer of knowledge he or she performs the role of informant, moderator, coordinator, and tutor, which was noted by a very small number of students. Foreign and later Ukrainian scientists defined a list of competencies that modern teachers should have when organizing training using online technologies.

Summarizing these data, we came to the conclusion that the presence of a single official remote platform of a higher education institution simplifies the organization of the mobile learning process and serves as an environment for creating educational content, checking and recording the educational achievements of students, and a platform for organizing feedback. It should also be noted that the organization of distance education at the H.S. Skovoroda Kharkiv National Pedagogical University was rated at a sufficient level by the respondents, which is presented in Fig. 3.

**Figure 3**

*Quality of distance learning at the university (0 – min, 5 – max)*

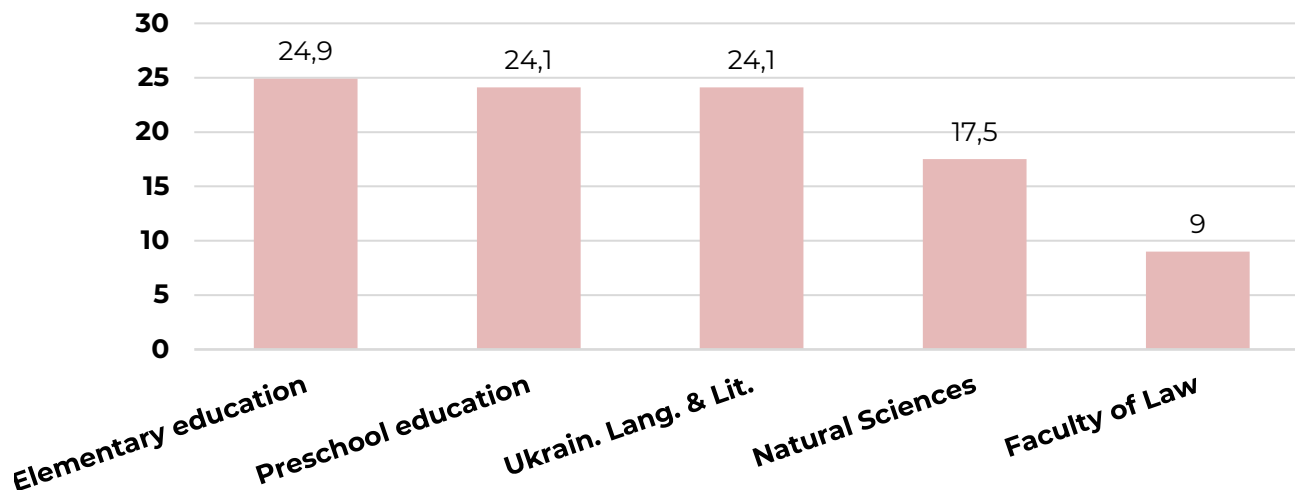


According to the survey, students from the Faculty of Elementary Education (24.9%), the Faculty of Preschool Education (24.1%), and the Faculty of Ukrainian Language and

Literature (24.1%) showed the most motivation for mobile learning, while the students from the Faculty of Law (9%) showed the least motivation, which is caused by the specifics of this faculty. (Fig. 4).

**Figure 4**

*Motivation of applicants for mobile learning*



### **Advantages and Disadvantages of Mobile Learning**

In addition to the psychological and technical readiness of education seekers, identifying the advantages and disadvantages of using mobile technologies in the educational process is of great importance. During the semester, which was affected by quarantine restrictions, along with traditional textbooks, a distance course was used, which was placed on the Moodle platform, and access to which within the framework of the experiment was carried out only from students' mobile devices.

The results of the questionnaire conducted at the end of the semester showed that 100% of students rated the educational process using elements of mobile learning positively. Students also highly appreciated the advantages of mobile learning, such as free access to educational materials, portability, flexible schedule, and the ability to work according to an individual schedule. Among the disadvantages were the rapid discharge of the battery and the instability of Internet access. Please note that the stated shortcomings do not essentially relate to the organization and technology of using mobile learning in the implementation of educational programs.

### **DISCUSSION**

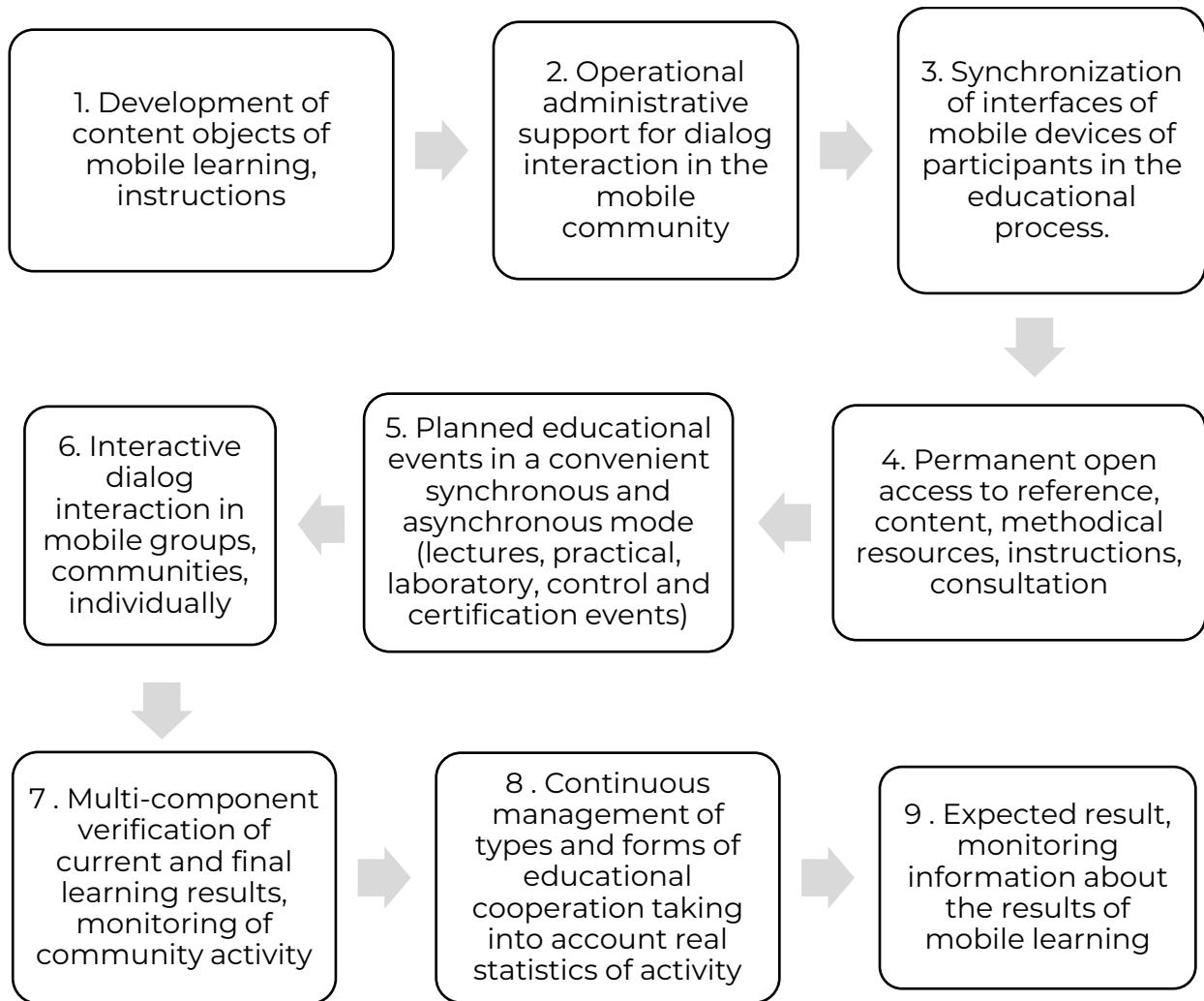
The results of the research show that during the organization of mobile training, it is necessary to take into account the technical and psychological readiness of the target audience, and even their competence in using mobile devices. The following road map for the organization of mobile learning can be proposed (Fig. 5).

The developed road map for the organization of mobile learning in institutions of higher pedagogical education takes into account the features determined by the results of the survey and the need for training future pedagogical workers for continuous career guidance. Based on the full acceptance by higher education students of the idea of using mobile learning and the advantages they identified, we singled out the first stage of the road map "Development of educational content, personalized programs, content

objects of mobile learning”. In this position, the previous experience of both the teacher and the students involved in mastering the educational component of one or another educational program is important. Undoubtedly, previous experience makes it possible to more clearly determine topics and content of the educational program are more expedient to study using mobile learning. To optimize and ensure the quality of education at this stage of developing mobile learning technology, it is worth analyzing student portfolios or previously completed works. The more precise the criteria for choosing the content intended for understanding with the help of mobile learning, the more successful the result will be.

**Figure 5**

*Road map of the organization of mobile learning in pedagogical institutions of higher education*



The analysis of student portfolios involves: clear criteria and their reproducibility in the content of completed works; and reference point for learning outcomes recorded in educational programs. We note here that usually a portfolio is a kind of map of achievements, a reflection of personal educational and communicative progress, and it gives an idea of the system of analytical actions of the acquirer. The more diverse the

works presented in the portfolio, the more accurate the analysis and selection of educational content will be.

The second stage of the proposed road map of mobile learning defines the organizational and operational aspect: Administrative support (schedules of the educational process, administrative resources of the educational institution, operational information about planned activities). Its implementation will be most effective in the case of targeting an initiative acquirer. The representation of student self-government is appreciated not only in extracurricular educational and entertainment work, but we also see the partnership of educational communications as extremely significant during the implementation of mobile learning.

We believe that relying on the strengths of active learners, including them as co-organizers of mobile learning, will clearly contribute to high-quality career guidance work during the mastering of an educational program within the walls of a higher education institution.

Because it is in this way that it is possible to monitor and create space for the development of leadership and organizational qualities. The same stage involves interactive dialog interaction in mobile tools, communities, individually. To ensure the quality of education, this stage should acquire a systemic character.

The third stage of the road map is synchronization of interfaces of mobile devices of participants in the educational process. Mobile devices and network coverage, interface, and mobile support for the interaction of participants in the educational process are the tools with which mobile learning is organized.

Therefore, it is worth thinking and agreeing at this stage in which way your mobile learning community will stand out: visual effects, use of a mobile application, tag phrases, hashtags or other means.

We support the position declared by the Ministry of Education and Science of Ukraine (<https://mon.gov.ua/ua>) that a modern Ukrainian higher school should form competences, synthesizing relevant academic and reliable knowledge, constant cross-cutting socially significant skills, value attitudes for organic integration into the world educational space.

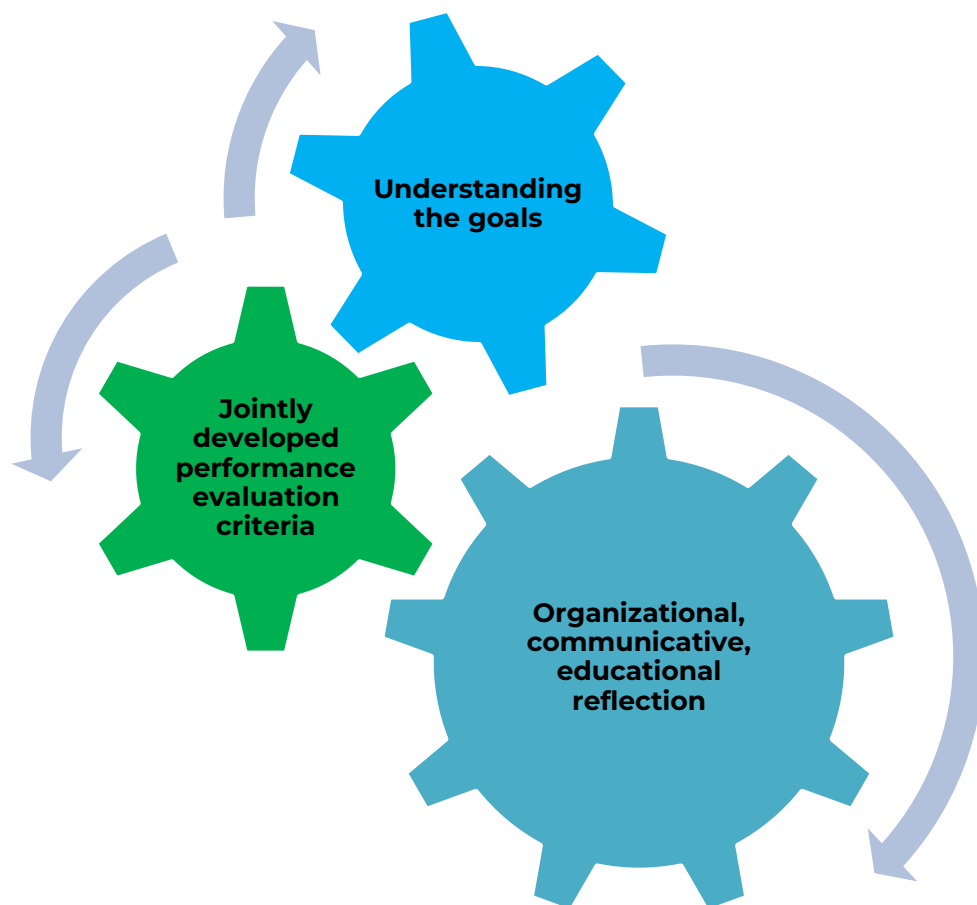
The attitude itself is formed at this stage: through the open constructs of the organizational format proposals, the search for resources to prevent the problem identified during the survey, the dependence on the amount of charge of mobile devices, the level of network coverage.

At this stage, each applicant who joined the mobile training can gain constructive experience in operating with patterns of criteria for evaluating the technical resources of mobile devices, gain experience in rational consumption, including experience in using energy-saving technologies.

A systematic evaluation of the ease of use of the interface, ways of responding in the mobile learning community will contribute to the formation of practical skills of systematic self-evaluation, which will gradually be transferred to the experience of self-evaluation of educational activities, the formation of internal incentives for learning. The success of this stage of the proposed road map can be seen as follows (Fig. 6):

**Figure 6**

*Success factors of the third stage of the road map for the implementation of mobile training for higher education applicants*



As can be seen from Figure 6, we identified reflection (organizational, communicative, educational) as the driving force. This comes from the methodology of this study and is due to the results of the survey of applicants. We consider reflection as a synthesizing component for the formation of students' psychological and technological readiness for mobile learning. Organizational, communicative and educational reflection serves, in our opinion, as the trigger mechanism that activates the understanding of goals and contributes to the development of common criteria for evaluating the effectiveness of steps in the implementation of the educational component using mobile learning.

Given that the authors have practical experience in organizing mobile learning, it is possible to single out aspects that will contribute to the optimization of this stage of the road map of organizing mobile learning in institutions of higher pedagogical education, namely: 1) reference resources, methodical materials, and instructions should be concise, simple, and if possible, visualized ; 2) involvement of students of higher education in the development of new and expert evaluation of the quality of the already available proposed instructions and materials of a reference, methodical nature.

Constructive, in our opinion, are techniques using emoji cards, hand signals, icons, emoticons, likes, scaling (up to 10 levels), input/output tickets, creation of short comics, cinquain, acrostic poems, intellectual maps, technology Z (I know)-HD (I want to know)-

D (learned), technologies 3 (didn't know)-2 (surprised)-1 (learned), technologies "Path of the hero", "Path of the goal", sketchbook, scribing, advertising posts, infographics.

Expert assessment of the quality of the already available proposed instructions and materials of a reference, methodological nature involves the use of the technology of the so-called inverted class, when the applicants have previously processed the proposed material. It is convenient to casually use the Padlet interactive whiteboard with comments using the "3, 2, 1" technology, when you can note down three positive points of the proposed instruction, two clarifying questions to the author, and one recommendation from an expert.

The fourth stage of the proposed road map for the organization of mobile learning also involves diagnosing problems by the teacher and finding ways to solve them in order to overcome difficulties in the development of cognitive communication, clustering of knowledge, creative and critical thinking, and assertive behavior of students of higher education. After all, the expert evaluation of the proposed methodical or advisory content must be clear, and contain up to three criteria (for example: design, reproducibility, ease of understanding).

This stage of the road map of the organization of mobile learning also involves the development of author's checklists, step-by-step instructions with deadlines and samples of expected results; open questions, scales for assessing attitudes, interviews, and blogs. Criteria for the effectiveness of this stage: expressiveness (means for the accuracy of understanding), efficiency (orientation on the quick and successful solution of educational interaction tasks), algorithmicity (there is a sequence, it can be reproduced), assimilability (facilitates the assimilation of the learning content by the learner), adaptability (reproducibility in different circumstances).

The fifth stage of the road map of the organization of mobile training involves the actual conducting of educational activities planned according to the schedule or individual plans of the applicants in a convenient synchronous and asynchronous mode (lectures, practical, laboratory, control and certification measures). This stage, in our opinion, is the most beneficial for establishing systematic partnership cooperation of all participants in the educational process.

We note here that despite the spread of ICT and AI technologies, it is the teacher as the organizer of mobile learning at this stage who creates conditions for the formation of educational and pedagogical culture and prudence, academic integrity and conscious responsibility for the realized right of a participant in the educational process, a sense of gratitude. Similar practices are presented in an article prepared by a research group with V. Vorozhbit-Gorbatyuk (2021).

We agree that relying on understanding, taste and character is especially important in partner cooperation. A sign of spiritual growth at this stage: manifestation of pedagogical optimism. The emphasis on the procedures of educational interaction and communication in mobile communities of applicants with OOP, resource support for applicants during temporary incapacity, mental fatigue, psycho-emotional disorders due to exposure to stressors is significant.

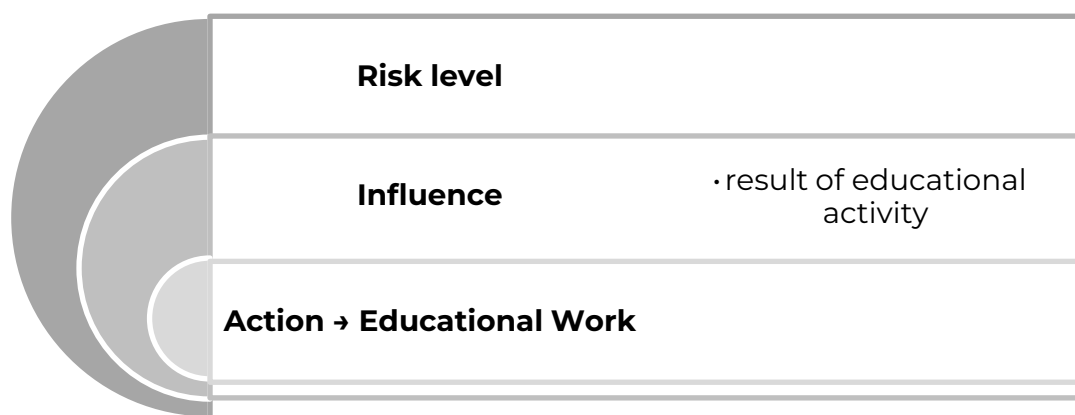
The sixth stage of the road map of the organization of mobile learning involves interactive dialog interaction in mobile groups, communities, individually. In our opinion,

the reference point for the quality of the organization of this stage is the awareness by the teacher and students, experts, and other participants involved in the monitoring and evaluation of the quality of education, of the fact that the life self-determination of the student and his active position in the educational process are a sign of the professional success of the teacher - organizer of mobile training.

We can determine the expected results of this stage of the road map of the organization of mobile learning with reference to the proposal by D. Kolb (2015): conscious acceptance by the participants that the educational process is no less important than the expected result; specific learning experience and reflection are the basis of partnership; all participants of mobile training are able to rationally understand the real life situation (visualized in Fig. 7).

### Figure 7

*Diagram of visualization of the elements of understanding of mobile learning*



The seventh stage of the road map for the organization of mobile learning: multi-component verification of current and final learning results, monitoring of community activity. This stage is effective under the condition of a well-thought-out strategy of formative assessment through systematic pedagogical observations. Such a strategy involves focusing on axiomatic statements: failure is a motivator for action; success – the right to rest; faith “I will do it”; designing based on personal strengths; technology of three “P” process – problem – program.

In our opinion, verbal techniques of formative assessment are productive - explanations based on comparison, analogy, identifying differences, indicating reasons, creating simple conclusions. Evaluative judgments in the form of proof, reduction to the obvious, refutation of the partner's point of view, conviction of the correctness of one's point of view, search for convincing arguments is quite useful, but time-consuming.

The next stage of the road map for the organization of mobile learning: continuous management of types and forms of educational cooperation, taking into account real statistics of activity. The tasks of this stage are the selection of such forms and types of activities that provide a high degree of interactivity and opportunities for applicants to improve their professional skills and increase self-esteem.

One of the methods of continuous management of educational cooperation is distance learning. Mobile devices make training individual, when the applicant can independently build the trajectory of his training at a time convenient for him and choose the optimal format. Educators have the opportunity to choose the content of

education taking into account their interests, therefore mobile learning is student-oriented.

The first (and most common) way of continuous management of educational cooperation is the use of a mobile phone as a means of quick access to information, to relevant content on demand via the Internet. This is instant access to specialized sites that contain e-learning courses, tests, practical tasks and additional educational materials (pictures, photos, sound and video files). Educational e-mail and instant messaging are also possible

The second possible use of mobile phones for education is the use of special programs for mobile phone platforms that are able to open and view files of office programs, such as Microsoft Office: Word, Power Point, Excel. Thus, having such files containing educational information in the memory of the mobile phone, it is possible to view versions adapted specifically for the phone screen, with convenient scroll bars, appropriate font and user-friendly interface.

The final stage of the road map for the organization of mobile education involves monitoring the quality of student learning results in the conditions of distance education and the procedure for determining and compensating educational expenses, individual work with education seekers. This allows you to evaluate the effectiveness of mobile learning and make the necessary adjustments to improve its effectiveness.

Disney's method, and debriefing were used. We see the quality criterion of this stage as stable personally significant incentives for learning, internal motivation for learning, when each member of the mobile learning community preserves the intrigue of learning until the end of the lesson/training course.

We also see the prospect of developing the idea of mobile learning in higher education institutions in the context of the formation of general competencies, for example: financial literacy. Mobile learning as a way of organizing educational interaction in asynchronous mode allows students to consistently form experience in designing effective solutions. Mobile learning in this direction makes it possible to analyze the needs of students (software, tools and means for quality learning, educational content, sources.). The second resource of mobile learning: to improve the learning experience.

Among the convenient tools of mobile learning for the purpose of forming financial literacy as a general competence, the following can be distinguished: the possibility of visualizing educational content according to the "equal to equal" principle, personalizing programs for the formation of this and other competences according to the principle of puzzles, sharing educational experience according to the modular principle, interactive exercises that can be to perform in a smartphone, the implementation of the principle of an open social environment, when students can observe how others learn.

We see methodological support (Ghoulam & Bouikhalene, 2024) and the development of innovative author's proposals for the practice of mobile training of applicants for the implementation of an individual educational trajectory as perspectives for further development , the involvement of independent experts, methodical teachers of vocational education and training, organizers of production and pedagogical practices, and stage holders of educational programs in institutions of higher pedagogical education to this format of educational cooperation.

## CONCLUSIONS

Thus, our study allowed us to determine the role and place of mobile technologies in the educational process, to choose the best strategies for providing students with portable devices, to assess the level of students (first-year bachelor's degree) in terms of technical and psychological readiness for mobile learning, to take into account the advantages and disadvantages of mobile learning; to develop multi-stage roadmaps and checklists for the use of mobile learning in the implementation of educational programmes or in the individual educational trajectory of an institutional student.

## CONFLICT OF INTERESTS

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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