

DISTANCE LEARNING AND TRAINING FOR STUDENTS FROM BELARUS

Ivan Asmykovich, Olga Pyzhkova, Inna Borkovskaya

Belarusian State Technological University, Belarus

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Abstract.

The article discusses the problem of modern approaches to distance learning methods. It examines the disadvantages and advantages of distance learning, briefly reviewing the latest publications on distance learning in mathematics and noting the main difficulties in such technology. Distance learning and the specificity of its implementation (technical, pedagogical, technological, organizational) are the subjects of scientific research. The findings of a survey conducted among Belarusian State Technological University students are utilized.

Results. The article proposes a solution to ensure the quality of mathematical education in modern conditions- a combination of classical teaching approaches with information and communication technologies. It emphasizes that the degree of knowledge assimilation depends not solely on the teacher's presentation of the material but also on the student's motivation to learn the subject.

Conclusions. We underscore the importance of instilling in students the skills of self-education, self-organization, independent decision-making, and the desire for self-development. We also stress the need to leverage all learning opportunities and establish feedback from students in online learning.

Keywords: distance learning; teaching methods; classical approach; information and communication technologies; educational problem; education.

INTRODUCTION

The increasing creative activity of the teacher characterizes the current stage of development of higher education. At all times, the higher school has been distinguished by the methodology of educational work and the degree of independence of students, and the purpose of the educational process was to develop the ability of students to continue self-education, to the desire to replenish and update their knowledge. However, 2020 necessitated a shift in the education methodology, compelling the introduction and active use of information and communication technologies (ICT) in the educational process. This shift responded to the difficulties in applying the classical approach, where all classes were held in classrooms. The coronavirus pandemic forced most teachers to transition to distance learning, confirming the significant problems in e-learning mathematics (Asmykovich, 2019; Parmuzina, 2020).

Through the coronavirus infection (COVID-19) epidemic, all countries, including Ukraine, have transitioned to the distance educational system. The distance has become a consequence of quarantine change, which has led to the transfer of effective established educational practices, widening technical and program supports, educational e-platforms, pedagogical technologies, and training methods. Thus, the need to investigate conditions (psychological, pedagogical, organizational) was actualized, influencing distance learning results. That is the **study object**.

Distance learning and the specificity of its implementation (technical, pedagogical, technological, organizational) are the subjects of scientific research. Among the results presented to a broad audience are the results of the work of N. Todorova & N. Bjorn-Andersen (2020).

A comparative analysis of distance and traditional learning from the standpoint of their psychological perception of the subjects of the educational process was carried out by M. Hennei and T. Newvine (2006). Researchers have published a comparative analysis of learning environments in terms of meeting the needs of part-time students of Australian colleges living in suburban areas and have come to the following conclusions: 1) students may sacrifice the quality of learning for the sake of convenience, time and money saving; 2) "hybrid" learning may be more effective than traditional learning. Ways to improve the effectiveness of distance learning were studied by M. Niari, E. Manus, and A. Lionarakis, who consider distance learning to be a rather controversial form of learning from the point of view of efficiency and therefore propose to apply the Pygmalion effect (high expectations from students may lead to an increase in the productivity of their learning). The results of their study showed that positive expectations of the tutor, and his encouragement, especially those expressed non-verbally, have a positive impact on the student's attitude to learning and increase his self-motivation (Niari et al., 2016).

S. Javan's many years of experience in the distance education environment allowed him to identify the following key factors for successful and psychologically comfortable distance learning: video conferencing and the ability to hold discussions; high-quality Internet connection; accessibility of educational material from any device; recording of lectures and the ability to view them at a convenient time; instant feedback from students when they complete assignments (Dhawan, 2020).

The quarantine restrictions that were introduced worldwide in 2020 due to the COVID-19 epidemic led to the widespread use of distance learning, which necessitated the actualization of scientific research on its effectiveness both abroad and in Ukraine. In particular, O. Babatunde and E. Soikan studied the crisis responses of universities to the migration of education to the online space caused by the pandemic. One of the results of their research was the conclusion about the unexpected impact of the pandemic, which pushed education to rapid and effective innovative and technical solutions to overcome technological, socio-economic, psychological, and pedagogical problems (Adedoyin & Soykan, 2020).

J. Knights identifies the problematic aspects of introducing distance learning during the pandemic. These include the excessive workload of teachers along with their lack of digital competence, problems with the safety and security of learners, and the risk of gaining a

negative experience of online learning, which will further block the desire to learn in this format (Winthrop, 2020).

The dynamically complex relationship between technology and human behavior in COVID-19 was studied by Zhen Yan, Professor of Psychology (State University of New York). He studied the psychological characteristics of student behavior in quarantine: "computer" student behavior (how students learn to use software); cyber behavior (how they understand the technical and social nature of the Internet); smartphone behavior (the relationship between smartphone multitasking and academic attention) and aimed to develop a model for implementing successful distance learning. The author concludes that, given the study of various types of human behavior (organizational, social, addictive, health behavior, and other types) in interdisciplinary fields, it is possible to develop a model for the successful implementation of distance learning (Yan & Gaspar, 2019).

The main problem, as noted earlier, was (Testov, 2018) the problem of understanding.

To organize distance learning at the Belarusian State Technological University (BSTU), various platforms and the experiences of colleagues from other countries were used. For example, in Poland, educational resources are posted on the universities' websites, in the Czech Republic, online classes are held, and students are offered to develop interactive essays on the topics covered.

The experience of organizing the educational process in mathematics shows that the level of technology used by the Department of Higher Mathematics of BSTU is effective in solving the problem of improving the quality of mathematical education and, as a result, the formation of the student's research competence (Asmykovich, Borkovskaya, Pyzhkova 2019).

The main purpose of this technology is:

- organization of independent work of students;
- awakening students' interest in acquiring knowledge;
- Assistance to the student in overcoming difficulties in studying;
- acceleration of the adaptation process for first-year students in the conditions of studying at the university.

Level educational technology is used in classroom classes in mathematical disciplines and is an effective tool that differentiates students' approaches and considers their characteristics. In modern conditions, it has become necessary to supplement the methods and forms of teaching used with information and communication technologies that make conducting classes in a remote format possible.

RESEARCH METHODS

Theoretical and empirical methods: system analysis of scientific, psychological, pedagogical, methodical literature, pedagogical observation.

RESEARCH RESULTS

Distance learning appeared in the 18th century, long before the Internet, and only the methods of its organization changed over time. It is a form of education where the teacher and

student interact at a distance, particularly with the help of ICT. Some supporters believe that such education can completely replace traditional learning. In response, we will give an example: when television began to develop intensively in the United States, there were active supporters of the assumption that shortly, television would replace both lectures by leading professors and practical classes. However, it quickly became apparent that these theoretical constructions were far from reality.

When using new information technologies in teaching, ideally, each student receives a complete lecture note in advance in electronic or printed form and comes to the lecture to listen to it meaningfully. With the help of presentations, the teacher summarizes and structures the material and explains difficult moments. Thanks to computer technologies, it is possible to implement more extensive material, as well as to highlight and explain in detail the main content of the lecture, give the main ideas and approaches, and offer material for independent study based on the indicated literature, which, in general, enlivens the educational process, making it more dynamic and diverse (Asmykovich, Lovenetskaya, 2019). But at the same time, the most critical issue, especially in the teaching of mathematical disciplines, remains the issue of a sufficiently good understanding of the material presented and the development of the technique of using mathematical models in solving practical problems and using mathematical models in the courses of engineering disciplines.

When organizing the educational process with the use of ICT, the center of gravity in learning shifts from teaching through lectures and practical classes (offline) to online learning on LMS platforms based on LMS Moodle, Microsoft Teams, Zoom, etc., and to the independent work of students in mastering the material (Goncharova, 2019). Thus, the intensity of training by the department staff of various materials for distance learning and remote classes increases. At the same time, there is no time for a detailed study of a particular platform. Teachers faced many questions, including, for example, how to build a distance learning system, control the process, ensure the assimilation of educational material for students in quarantine, etc. So, as at all times, the questions remain urgent: "What do we teach?", "How do we teach?" and "What do we get as a result?".

The success of online learning hinges on the material and technical support of the educational process and ultra-high-speed Internet. Even though about 70% of the surveyed students (155 students of the Faculty of Organic Substances Technology took part in the survey) have laptops, the majority of them use smartphones to work in LMS; many have technical problems (with connection, sound, and support for the capabilities of educational platforms).

The distance learning system (DLS) of BSTU based on LMS Moodle has been used for more than one year.

The transition of lectures to an online format required both time and the introduction of new technologies (Garayev, Babina 2020). At first, lectures were freely available in the LMS Moodle for each stream, during scheduled classes, the teacher conducted chat classes, having previously sent out a list of questions, using elements of a teleconference. However, the assimilation of theoretical material went very poorly. The availability of various materials on the Internet for answering the teacher's questions does not mean that they are found, and even more so, the assimilation of the information obtained in this way does not remain in the memory for a long time. Over time, lectures began to be held in an almost traditional format: via videoconference in LMS or Microsoft Teams. The lecturer presented new material, asked questions, and supported chat classes, while the question of attending such courses or the

presence of students at the lecture remains open. When asked which presentation of the material was more acceptable, 54% of the surveyed students answered that it was online lectures in Microsoft Teams. The students attributed the following to the advantages of such lectures:

- you can study anywhere (dormitory, home, classroom, etc.);
- no need to waste time traveling;
- The ability to view the lecture recording at any time convenient.

Disadvantages:

- there is no control on the part of the teacher, and, therefore, many people do not write lecture notes;
- insufficient motivation or its absence, it isn't easy to study when neighbors are either sleeping in the same room or doing their own thing;
- Some lectures must be missed due to the combination of online and offline classes.

Practical classes were held as usual for some students. The rest received assignments through the distance learning system. Answers to the tasks had to be sent at a predetermined time in doc or jpg formats. Teachers, especially assistants, had too much burden on checking assignments; they made their notes and sent corrected files back to students while advising students in various messengers.

Due to the epidemiological situation in the second half of the semester, some of the practical classes were held online, and control activities and laboratory classes were held at the university. At the same time, it was problematic for the teacher and the student to conduct 3-4 courses according to the schedule in front of the computer screen. Teachers of the department implemented online training in the form of conferences in the DLS of BSTU on Microsoft Teams and Zoom platforms. These platforms support video communication, audio communication, screen sharing (of the entire desktop or one application), virtual whiteboard (Teams, Zoom), and video recording. Before and after practical classes, teachers always left time to communicate with students and discuss the difficulties of a new form of education. It should be noted that students motivated to study persistently mastered the material and, in principle, coped with the task despite objective difficulties. Still, for many, the need for offline practical classes and contact with the teacher-led to apparent difficulties in solving some class problems and an inability to reason logically.

When asked in the questionnaire about their preference for conducting practical classes (online or offline), 80% of students answered that nothing can replace "live" communication with the teacher. And of the platforms that they used, they chose Microsoft Teams or Zoom (88%).

Midterm control of knowledge assimilation (by topic) was carried out in the classroom, mainly through tests. For exams, in light of compliance with epidemiological requirements, a written form was recommended, which required the teacher to think carefully about the content of the exam tickets. For an objective assessment of students' knowledge level, the tasks, on the one hand, must be recognizable. On the other hand, they must assume the student's independent thinking activity. Each teacher has accumulated additional experience during the exams, which must be used in the future.

Such experience led, among other things, to the following conclusions:

- A well-prepared student with a high level of motivation manages to overcome the difficulties of remote learning and demonstrate good answers to the exam. Of course, you must

work independently, and the importance of independent work has increased many times. With its skillful organization and the use of opportunities for communication with the teacher (even through information and communication means, although most teachers conducted consultations in a "live" format), it is possible to achieve a high level of mastery of the material;

- The qualities of a student, such as the ability and desire to process and assimilate the proposed information independently, come to the fore in preparation. There are pleasant "surprises" when you want to tell a student about his answer during an exam: "This is better than you could expect." By the way, among such "average" students, there are many who have been ill for a long time, were in quarantine, and at the same time did not lose but only gained the desire to study. The desire for self-development, learning "for oneself," is sometimes a much more motivating factor than others;

- if a student has inferior initial training and, at the same time, a weak level of communication with the rest of the students in the group, then the remote form of learning is overwhelming for him and often leads to a "failure" at the exam. Such a student cannot move forward in preparation and generally loses motivation. Suppose such a problem is identified in advance. In that case, the teacher can try (of course, if the student himself takes the initiative) to help the student organize his independent work and conduct several consultations in the usual format. If possible, such consultations should be held, and the midterm control in the classrooms, of course, is very informative. Many students are active during remote classes, trying to show their presence, but later, it turns out that this is only the visible side. The level of these students is so weak that the material is not mastered at all, and the result on the exam is unsatisfactory.

The remote form of conducting classes and its combination with the "live" format of consultations requires using the full potential of the teacher's methodological and technical skills, and his physical training is far from excessive, the loads are very high.

DISCUSSION

In many countries, including the United Kingdom, Japan, Europe, and the United States, educational institutions have launched an e-bank of teaching materials. Audio and video teaching materials are distributed not only via the Internet but also via radio and television (Dhawan, 2020). That promotes lifelong learning and helps realize the role of technology in obtaining knowledge of various kinds anywhere and anytime. The success of distance learning is ensured by various factors. For example, (Mladenova et al., 2020) notes that in European countries, distance learning is significantly influenced by the following factors: motivation; usefulness and acquired skills; exam grades; workload; discipline; professional communication with teachers and feedback.

In UK universities and colleges, distance learning programs are based on the principle of independence, which is ensured not only by flexible and well-structured curricula but also by the willingness of young people to use IT to search for and analyze information. For the most part, students plan and organize their studies on their own. They are required to be able to use information sources to perfection, to be able to analyze and interpret information, and to think critically (Peter, 2018).

Distance learning in Japan is positioned as a "lifelong learning" strategy, so it is actively

used for professional development or retraining. The quality of education is achieved by the result of highly qualified teaching staff and the introduction of a system of self-monitoring and self-assessment (Nestorenko & Pokusa, 2020). In Italy and Germany, special attention is paid to cognitive load, pedagogical design, and control methods for the success of distance learning (Nestorenko & Pokusa, 2020). At the same time, information technology provides interactivity and feedback.

The spread of COVID-19 has determined certain features in the provision of educational services worldwide, as evidenced by numerous international conferences that discussed the problems and progressive experience of distance learning gained in the context of the pandemic crisis (Emily & Ellen, 2017; Carretero Gomez et al., 2017). Scientists recognize that: 1) the previous experience of implementing distance learning was mostly fragmentary and experimental, and since 2020 such learning has become widespread; 2) if earlier the problems of distance learning included the quality of the Internet, the lack of \ proprietary software and hardware, today the problem of "humanization" of distance learning, the difficulties of its psychological and emotional perception by all participants in the educational process is actualized; 3) among the ways to increase the effectiveness of distance learning (Rudenko et al., 2021).

We additionally analyzed publications, in particular (Semenikhina et al., 2018), that cover author's programs of special courses on the use of special-purpose programs in the study of certain disciplines, and they differ in both the software environments studied and their number. Currently, there is a tendency for more active involvement of specialized software. At the same time, each of the math teachers uses the programs they like best, and not necessarily all of them (Semenikhina & Drushlyak, 2014). At the same time, mathematics teachers are aware of the need to master several tools, arguing that although the methodology of working in the environments is the same, the tools they provide allow them to find new ways to visualize problem solutions and introduce different teaching methods and techniques (Semenikhina & Yurchenko, 2016).

What has the use of remote learning shown? It once again confirmed that the result of learning depends not only so much on the form of presentation of the material by the teacher but also on the desire and ability of the student to assimilate this information. While it is possible to conduct classes in the usual "live" format, it is necessary to lay in students in advance the skills of self-education, teach them to organize their work, their time, the ability to take the initiative and make independent decisions, to educate students in the desire for self-development. If online learning is necessary, the teacher should use all opportunities to help the student in the learning process, providing him with the required support to assimilate knowledge. Such a cooperation strategy should be aimed at maintaining and improving the quality of education in a problematic epidemiological period

CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

Information technology is necessary and very useful for good students interested in the quality of their education and engaged in student research work. Students get acquainted with modern educational content. Within the framework of distance communication, the teacher

considers the solutions students receive and advises on their analysis and further research. The role of distance education will increase due to the objective need for the transition to a system of continuing education. In the context of an ever-increasing flow of information, education should accompany a person throughout his life. In this situation, it is essential to lay a solid foundation of knowledge at school and university and understand the need to replenish it in the continuing education system.

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