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The article considers the advantages and disadvantages of distance learning in terms of creating conditions for the development of intellectual abilities.

1. The results of research suggest that distance learning technologies can be successfully used to improve the quality of learning, stimulate the cognitive needs and interests of students and create conditions for the development of their intellectual abilities. It is advisable to use distance learning in order to ensure equal access of gifted youth to quality education.

2. Distance learning technologies allow students to save time and encourage them to master modern infor-

mation and communication technologies. At the same time, modern pedagogical technologies of distance learning do not provide objective, timely and comprehensive control over the level of student achievement.

3. Motivation is a decisive factor in the success of learning and development of abilities. A significant advantage of distance learning technologies is the wide range of opportunities to motivate and interest students.

4. Distance learning should not be considered as an alternative to traditional learning. Distance learning technologies have a number of disadvantages, the main of which are the threat of negative impact on the health and socialization of students, unresolved issues of distance control over the quality of learning, the impossibility of distance learning of certain types of work requiring special equipment, certain conditions, etc.

**Key words:** Distance learning, shortcomings, development of abilities, technologies, equal access, motivation.

Отримано: 3.07.2020

УДК 378.147

DOI: 10.326626/2307-4507.2020-26.142-144

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In modern conditions of on-line education in higher educational institutions, an emphasis is placed on the independent work of students. The article examines the possibilities of expanding the independent work of students in the study of physics. Methods of conducting lectures, practical exercises on solving problems and laboratory work are considered. It is indicated that the independent work of students should be guided and the need for a clear goal, objectives and form of such work is formulated. For the successful organization of independent work of students, it is important to clearly define the form of the assignment and the time for its completion. When teaching on-line, a special responsibility is assigned to the teacher.

**Key words:** on-line training, independent work of students, problem solving, laboratory work.

Organization of students' independent work has always been a serious and complex problem. Moldova's accession to the European educational space requires that special attention should be paid to students' individual work, which increases over the years. Thus, for students from the 1st cycle of studies (in Moldova it is licentiate), usually the share of individual work constitutes at least 50% of the hours (credits) assigned to a given discipline. The hours allocated to individual work increase and may amount to about 75% for the students of cycle 2 (master's degree). Thus, in today's learning environment in higher education institutions there is an emphasis on students' independent work.

However, in reality, unfortunately, there is the opposite process: students hardly and without much desire to do the necessary homework, and this is due to a number of reasons. First of all, it is "sitting" in the widely available Internet (Facebook, Instagram, Однокласники, etc.): came in for a minute and stayed for several hours. Secondly, it is poor school preparation, which does not allow performing quickly and successfully the necessary work. There is a decrease in students' motivation to get a quality education in finally. However, the problem has become particularly acute and urgent due to the lear-

ning situation associated with the COVID-19 pandemic. Despite the fact that great attention has always been paid to individual work of students, under the conditions of the abrupt transition to on-line learning many difficulties arose for both students and teachers. The time of direct "teacher-student" contact decreased, most of the theoretical material was sent to students for independent study and, therefore, the possibility of detailed explanation of the studied material decreased. The successful study of the course "General physics" is connected not only with the direct study of theoretical material rather on the contrary, the theoretical material is learned by means of practical classes: solving tasks and carrying out laboratory works.

*The purpose of this article is to investigate the possibilities of expanding students' independent work in the study of physics in the course of practical classes in the distance form of education.*

Individual work of the student is the most important element of the learning process, as it contributes to the formation of such skills and abilities that will allow them in the future to independently and successfully solve complex production tasks. Distance learning involves the expansion and deepening of students' independent work. The

relevance of this problem is connected with the fact that, on the one hand, the probability of prolongation of on-line learning in the next academic year is not excluded and, therefore, it is necessary to prepare for such a variant of the educational process in advance. On the other hand, distance learning is becoming more and more a part of our life and it does not necessarily have to be any stage of higher education. It can be various kinds of courses that are conducted online and end with a certificate. All of these methods of learning require serious independent work.

Independent work of students is a special form of education, which implies the process of learning without the direct participation of the teacher and which, nevertheless, should be carried out under his guidance. Thus, students' independent work is a manageable process. Higher education implies a wide range of learning activities, which, in general, are divided into classroom and non-auditory. A distinctive feature of independent work in higher education is that the teacher only organizes the process of cognition, the cognition itself is carried out by the student independently and individually. The global educational space is increasingly shifting the emphasis towards non-academic activities of students. The form and specific weight of such activity in the general educational process is determined, first of all, by the discipline studied. The concept of competency-based approach in education implies effective development of the student, in order to enhance the possibilities of his/her preparation for adaptation in the modern society [1].

In the conditions of on-line learning this type of learning becomes one of the main ones, as students manage their activity independently for quite a long time, not being subjected to daily/weekly guidance/control from the teacher. It is under these conditions that the need for guided independent work is actualized and, therefore, it is especially important to methodologically justify and provide this type of learning activity. For this purpose it is necessary to clearly formulate goals, tasks and forms of students' independent work depending on the studied subject.

The teaching of physics classically involves three types of activities: learning theoretical material, developing the ability to solve problems, and developing the skills to conduct experiments, which is based primarily on performing laboratory work.

*The study of theoretical material* by students can be organized in the easiest way. Students are offered a course of lectures and a list of all necessary literary sources. There are more than enough different textbooks and tutorials on the course of general physics. All materials prepared by the teacher are either transmitted directly to students or installed on one of the educational platforms. One of the most widespread such systems: is Moodle (Modular Object Oriented Distance Learning Environment) platform, which is a modular environment designed for distance learning and is a guide to didactic material [2]. The possibilities of this platform are very wide: didactic material can be presented in several forms: a course of lectures, a list of literature sources, assignments for practical lectures and homework, tutorials for laboratory work, etc. depending on the discipline and the topic studied.

For direct lecturing online you can use software like Skype or Zoom, but the learning process will be more effective if students get acquainted with the content of the

lecture in advance, and during the lecture they pay more attention to the discussion of details and questions that have arisen.

When conducting *practical classes on problem solving of tasks*, the same methods can be used as in the case of teaching theoretical material: pass on to students the solution of typical problems or use ready-made links from the Internet.

This problem should be paid special attention to, because unfortunately, schoolchildren almost do not know how to solve problems. Moodle platform allows you to make the learning process parallel, namely it allows you to use the so-called "interactive whiteboard". During on-line classes, the teacher writes down the solution on this board, and so the students get ready-made solutions. In this situation, a great advantage is the possibility: on the part of the students to ask questions, to give detailed explanations – on the part of the teacher. The general and important principle in this case is the following thesis: "To learn to solve problems – it is necessary, strange as it may sound, to solve them. The more problems the student solves, the more chances for success he/she has, since practice plays a dominant role in this aspect.

One of the most difficult tasks in the case of training on-line *is to perform laboratory work*. There are various possible options here, for example:

✓ On the Internet it is possible to find such a laboratory work, presented in the form of a video. The student simply gets acquainted with the methodology of the lab. Work, with the method of verification of a physical law or the method of determining a particular physical parameter. The teacher can and should accompany this video with his/her own, more detailed comments and explanations, however, and all the same this process implies passive participation of the student in this type of learning. In order to enhance the active activity of the student, it is possible to assign students to find a video of the laboratory work on a given topic on their own. However, this is fraught with an increase of time "sitting" on the Internet and distraction to other more interesting to the student videos.

✓ In many cases it is possible to perform virtual laboratory work. The student sets the initial conditions, as if actively participating in the process of laboratory work, but this way of carrying out is also not attractive. If we proceed from the condition that the performance of laboratory work should contribute to the development of experimental skills of the future physicist, then in this option there will be no special benefit in this sense. However, there is a positive moment, consisting in the development of analytical thinking of a student and consolidation of theoretical material.

✓ The next possibility of carrying out laboratory work: the teacher himself performs laboratory work, in a specific laboratory and on a specific installation, and shoots a video, makes the necessary measurements and puts them in the table. The student is given a video of the measurement process and the results of measurements, which he already independently processes, makes the necessary calculations and, accordingly, conclusions. Such process is more preferable, as the share of independent work of the student increases and he should independently estimate the received result, which will require from him knowledge of the theory.

✓ Another way to develop experimental skills is that the student is given the task of finding some physical parameter or testing a physical law. A list of instruments/devices that can be used is also offered. The student must find his/her own ways of solving such a problem, try to perform an experiment (if it is possible under the given conditions) and calculate the necessary parameters. This way allows developing students' creative abilities, which is a particularly positive moment.

Conducting laboratory work is a combination of practice and theory, which, on the one hand, contributes to a deeper understanding of the essence of a physical phenomenon or law, and on the other hand – the assimilation of the studied material [3, 4].

It is possible to strengthen cognitive activity of students by introducing such types of independent works [5] as: abstracting from primary sources, offered by the teacher of topics; preparation of essays and presentations; making a summary, systematizing theoretical and practical material, table; construction of graphs [6] to check physical laws; conducting research work. All these elements of independent work contribute to a deeper understanding of the studied material, develop creative abilities and the ability to systematize it, allow developing the ability to create and use graphic material, briefly and clearly formulate the main essence of the studied material and draw conclusions. Such work of students contributes to the development of independence in solving the task assigned to them.

All kinds of activities of students in the end result should be subjected to control. In addition to the teaching role Moodle platform also allows you *to control and assess student knowledge*: periodic testing on various topics and *the exam* at the end of the semester.

When checking the results of independent activity of students, the teacher is faced with difficulties, from the usual copying off each other, to direct plagiarism from the Internet. In order to exclude such variants it is desirable to conduct control works on "General Physics" also on-line and to give as a task – problem solution.

In the conditions of the educational process carried out on-line, student's independent work is a defining component of the cognitive process, the purpose of which is the formation of skills, abilities and knowledge, which in the future will provide future specialists interest in creative work and ability to solve production tasks independently.

For successful organization of students' independent work it is important to clearly designate the form of the task and the time of its implementation. The turning in an assignment late leads to a lower grade.

On-line learning places a special responsibility on the teacher, which in many cases requires him or her to present the material in electronic form, which undoubtedly takes more time to prepare for classes.

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#### РОБОТА З СТУДЕНТАМИ В УМОВАХ НАВЧАННЯ ON-LINE

У статті представлені проблеми викладання фізики в гімназії. Показано, що лабораторні роботи сприяють глибшому розумінню учнями законів фізики і отримання знань і умінь в області експериментальної фізики. При виконанні лабораторних робіт учні використовують спостереження, досвід і експеримент, які підтримують і розвивають наочно-образне мислення. У вигляді діаграми представлені етапи проведення лабораторних робіт. Підкреслюється необхідність вивчення методики побудови графіків і розрахунку похибок експерименту.

**Ключові слова:** гімназійний цикл, лабораторні роботи з фізики, експеримент, діаграма проведення лабораторних робіт, графік, похибки експерименту.

Отримано: 14.09.2020