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## СТУДЕНТОЦЕНТРОВАНИЙ ПІДХІД У СИСТЕМІ ЗАБЕЗПЕЧЕННЯ ЯКОСТІ ПРОФЕСІЙНОЇ ПІДГОТОВКИ МАЙБУТНІХ ФАХІВЦІВ

**Анотація.** У сучасних умовах розбудови вищої освіти в Україні актуалізується питання реалізації ідеї студентоцентризму як необхідного складника системи забезпечення якості професійної підготовки майбутніх фахівців. У статті розглянуто особливості реалізації студентоцентрованого підходу як системоутворювального принципу організації освітнього середовища закладу вищої освіти в умовах сучасних освітніх реалій. Проаналізовано та систематизовано основні ідеї студентоцентризму як підходу до організації освітнього процесу відповідно до його складових, визначених Законом України «Про вищу освіту». Розглянуто процедури реалізації студентоцентрованого підходу відповідно до вимог Стандартів та рекомендацій щодо забезпечення якості в Європейському просторі вищої освіти. Здійснено контекстний аналіз студентоцентризму як характерної ознаки вищої освіти, на основі якого виокремлено суспільний (цивілізаційний), філософський, соціальний, психологічний, педагогічний, управлінський та особистісний аспекти означеного феномену. З'ясовано необхідність створення освітнього середовища, орієнтованого на задоволення потреб та інтересів здобувачів вищої освіти. Розкрито роль ідеї студентоцентризму у проектуванні освітнього середовища закладу вищої освіти. З'ясовано, що студентоцентроване освітнє середовище являє собою сукупність взаємопов'язаних різнобічних умов реалізації освітніх потреб та інтересів студентів, до яких належить система інтелектуально-комунікативних, організаційних, навчально-методичних, інформаційних, технологічних, матеріально-технічних ресурсів ЗВО. Наголошено, що реалізація студентоцентрованого підходу окреслює шляхи проектування освітнього середовища сучасного університету, орієнтованого на постійний розвиток і самовдосконалення майбутнього фахівця, що є необхідною умовою забезпечення якості вищої освіти в Україні.

**Ключові слова:** студентоцентризм, студентоцентрований підхід, освітній процес, освітнє середовище, професійна підготовка, якість вищої освіти.

## ORGANIZATION OF EDUCATIONAL COOPERATION IN A DIGITAL EDUCATIONAL ENVIRONMENT IN MATHEMATICS LESSONS IN PRIMARY SCHOOL

**Abstract.** For students to successfully master mathematics in the conditions of a digital educational environment, it is important to create conditions that would promote an increase in the interest in learning of students of primary education and ensure the development of their abilities and key competencies in the learning process.

The article examines the essence, content and forms of educational cooperation in remote mathematics lessons in elementary school with the help of digital applications. It is emphasized the need to use digital technologies both in the process of developing digital literacy of teachers and in the context of organizing digital cooperation between teachers and younger students in the context of using ICT tools and creating conditions for their integration into the educational process.



The requirements of the Concept of the New Ukrainian School regarding the mathematical competence of lower grade students were considered. The essence of the key concepts of the research is analyzed. The principles of cooperative learning are highlighted. It was noted that the main idea of cooperative learning is to learn together, and not just to perform together. The technology of preparing and conducting a mathematics lesson using the remote form of learning in cooperation based on small groups is described. Some forms of organizing collaborative learning in remote mathematics lessons based on small groups and digital means of their implementation are outlined. Special mathematical websites and applications are presented that can significantly motivate students to solve mathematical problems, visualize content and develop key competencies of students.

It was concluded that the organization of educational cooperation in a digital educational environment in mathematics lessons in elementary school involves such interaction between the teacher and students, students among themselves in the educational situation, during which the children's established methods of action are restructured, the components of educational activity are formed (that is, formed learning ability).

**Keywords:** cooperation, educational cooperation, digital educational environment, digital applications, students of lower grades, mathematics.

## INTRODUCTION

**The problem formulation.** Today, in the context of the implementation of the New Ukrainian School Concept, the educational process should be aimed not at the accumulation of knowledge, but at the development and development of students' ability to act, to apply their own practical experience in problematic circumstances.

One of the key competences that must be formed in primary school students according to the State Standard of Primary Education, approved by Resolution No. 87 of the Cabinet of Ministers of Ukraine on February 21, 2018, is mathematical, which includes the ability of children to identify simple mathematical dependencies in the surrounding world, model processes and situations with the application of mathematical relations and measurements, to realize the role of mathematical knowledge and skills in a person's personal and social life (State standard of primary education, 2018).

Mathematics is a fundamental science that combines abstract and general knowledge, is used in all fields of knowledge and is a unique means of forming the intellectual potential of an individual, developing his logical thinking (Kateryniuk Kh., 2021).

For students to successfully master mathematics in the conditions of a digital educational environment, it is important to create conditions that would promote an increase in the interest in learning of students of primary education and ensure the development of their abilities and key competencies.

The COVID19 pandemic has actualized the need for the development of the digital educational environment of educational institutions and the organization of distance learning in the e-environment. This applies in particular to elementary school. One of the ways to motivate students during distance learning is the use of digital applications for organizing cooperation. They are a powerful tool for conducting mathematics lessons and improving the quality of learning for younger students.

**Analysis of recent research and publications.** The issue of organizing educational cooperation in the digital environment of institutions of general secondary education has gained considerable popularity among the academic community of Ukraine and the world in recent years. The problems of the use of information and communication technologies and the peculiarities of the use of the Internet in the educational process are devoted to the research of scientists: V. Bykov, M. Zhaldak, M. Kademiia, H. Kedrovych, M. Koziar, N. Morze, N. Opushko, O. Spivakovskyy, and others. The works of scientists L. Karamushka, O. Komar, L. Pyrozhenko, O. Pometun, G. Syrotenko, S. Sysoieva and others are devoted to research related to the organization and methodology of interactive learning. The works of Ukrainian Scientists L. Koval, O. Komar, S. Lohachevska, T. Lohachevska, O. Onopriienko, S. Skvortsova and others are devoted to the issue of the methodology of teaching mathematics in elementary school. The works of V. Andriievska, N. Kovalova, N. Olefirenko, T. Pushkarova, O. Rybalko, N. Rudenko and others are devoted to the study of the use of ICT in mathematics lessons in elementary school.

**AIM AND TASKS RESEARCH** – to reveal the essence, content and forms of educational cooperation in remote mathematics lessons in elementary school with the help of digital applications.

**RESEARCH METHODS:** theoretical: analysis of philosophical, psychological, pedagogical and educational-methodical scientific literature, dissertation studies, legislative framework of education to determine the state of the problem of organizing digital cooperation in the conditions of primary school; synthesis, induction and deduction - for conducting a theoretical analysis of the problem of using ICT in mathematics lessons; classification and generalization - to identify digital applications and sites aimed at organizing digital cooperation of junior high school students in mathematics lessons; empirical: methods of observation, questionnaires - to identify the level of application of methods of group cooperation in mathematics lessons in elementary school.

## RESULTS OF THE RESEARCH

Today, in Ukraine and throughout the world, we are observing the process of global digitalization. Therefore, digital literacy, digital skills and competencies of all participants in the educational process are the goal of educational policy and an important factor in the full and successful development of society and the economy of the state (Kuklina O.M., 2018).

In Ukraine, in the context of the implementation of the New Ukrainian School reform and distance learning technologies, it is especially important to use information and digital technologies both in the process of developing



digital literacy of teachers and in the context of organizing e-collaboration between teachers and students of younger grades (Ostapenko A.A., 2005).

Note that during individual work, students strive to achieve their own goals, without taking into account the experience of other peers, and focus on their own efforts and success. At the same time, they do not pay attention to others.

At the same time, cooperation is the joint work of several people aimed at achieving common goals. Working in a team, a person is forced to think not only about himself, but also about others. Thus, cooperative learning creates conditions for positive interaction between students in the process of achieving a common goal: everyone understands that they can succeed (that is, master certain knowledge) only if other members of the group achieve the set goals (Pedagogy of cooperation, 2021).

The main idea of cooperative learning is to learn together, not just to perform together.

The main principles of cooperative learning are the following:

- interdependence of group members (common goal that can be achieved only together; distribution of intra-group roles and functions; uniform educational material; common resources; common reward);
- individual responsibility of everyone (everyone is responsible for himself and his team members);
- equal share of participation of each member of the group (division of a joint task into subtasks);
- reflection - group discussion of the quality of work and effectiveness of cooperation with the aim of further improvement (Vasyleva Y.V., 2010).

During cooperative learning, special attention is paid to group goals and the success of the entire team, which can be achieved only as a result of the independent work of each member of the group in constant interaction with other members while working on a topic (problem, question). The task of each student is not only to do it together, but also to learn something together, so that each student of the team acquires the necessary knowledge, develops the necessary skills and competencies. At the same time, it is important that the whole team knows what each student has achieved, that is, the whole group should be interested in the assimilation of educational information by each of its members.

Learning mathematics is an important factor in primary education.

Mathematical development of a junior high school student is the development of his abilities for intellectual activity, logical thinking, perception and spatial orientation.

In elementary school, the child acquires elementary mathematical knowledge, which forms the basis of mathematical science. Further learning of science and more complex sections is based on them (Metodychni rekomendatsii, 2021).

The teacher's task, especially at the initial stages of school education, includes the development of students' orientation towards mastering mathematical laws and the skills of their practical application. Mathematics is necessary in everyday activities of every person. It is this idea that the teacher needs to convey to every child.

The global pandemic of COVID19 actualized distance learning as the only possible way of carrying out the educational process. The transition of educational institutions to a distance form required teachers to increase the level of digital competence, in particular, in terms of finding digital tools to ensure effective educational cooperation in lessons.

Communication and cooperation of students in class is one of the main principles of personality formation in the system of developmental education.

Based on the features of distance learning, educational cooperation in the digital educational environment is an integral component of modern lessons. This is an activity-oriented process within one group, the goal of which is to solve the set didactic task. The teacher, planning educational activities, creates an educational situation in the lesson, focusing on the selected digital tools (Vasylieva M.M., 1988).

The technology of preparing and conducting a mathematics lesson using the remote form of learning in cooperation on the basis of small groups involves the following actions on the part of the teacher: choosing the topic, goal and tasks of the lesson; determination of the amount of educational material to be studied in class; preparation of tasks for group work, didactic material; determination of the format of cooperation, the number of groups, the necessary digital tools of the organization and support; distribution of intragroup roles; selection of stages of the lesson at which the organization of group work is planned, consideration of the issue of integration of group work into the general structure of the lesson, determination of the duration of group work; development of rules for individual and group assessment in the lesson ( ).

Let's outline some options for organizing cooperative learning in remote mathematics lessons based on small groups.

1. Learning in small groups. In order to divide students into groups, you can in particular use the ZOOM platform. This platform provides many opportunities for group interaction (in particular, division into groups using the "Session Halls" tool, which must first be activated on the website <https://zoom.us> in the advanced settings section.

The optimal number of students in the group is 4-6, who either work on a joint task or perform their individual role (certain actions).

For example, during a 3rd grade math lesson on the topic "The order of performing arithmetic operations in expressions", you can divide the children into groups and give each group 4 examples. For example, one of the groups may receive the following examples (Skvortsova S.O., 2021):



$$46 - 8 \cdot 4 + 56 : 7 = \dots \quad (\text{key: } 22); \quad 27 + 5 \cdot 9 - 8 \cdot 3 = \dots \quad (\text{key: } 48);$$

$$55 - 35 : 7 + 32 : 8 = \dots \quad (\text{key: } 54); \quad 56 : 7 : 4 \cdot 9 : 6 = \dots \quad (\text{key: } 3).$$

Task for students: determine the order of actions, solve examples. Based on the received answer, find a letter and make a word from the 4 letters received.

So, to the previous example: 3 – s, 22 – p, 48 – l, 54 – u. And the correct answer is a plus.

It is worth noting that children can solve the examples together, or they can share the examples among themselves and solve them separately from each other. In this case, it is important that the teacher correctly sets the time for completing the task, which should be sufficient for its completion (Vasyleva Y.V., 2010).

Note that the duration of the students' stay in the session halls can be set when dividing into groups. Also, during the work of the session halls, the teacher can enter the halls to the students, monitor and direct the process of completing tasks.

The results of joint activities can be organized using the interactive Google Jamboard, which allows the teacher to demonstrate key information during the lesson, as well as simultaneously interact with the whole class or a separate group of students in real time.

A similar task can be performed using the Padlet interactive whiteboard. This is one of the most popular services for creating online collaboration and interaction spaces. On online boards you can post tasks and perform them together, share educational information, collect ideas for projects and discussions. With the help of Padlet, they organize brainstorming, summarize and systematize knowledge, leave individual posts, notes, files, links here, as well as comment and evaluate them. On the boards, you can not only post information, but also interact with the content by rating, liking or leaving comments.

You can divide children into groups in this resource using a specific board format - "Shelf". One of the columns can contain tasks, and students can work in groups, placing data in other columns. In addition, among the data that can be attached to the "stickers" on the board, there is a drawing sheet that allows children to write on it, solve examples, problems, add answers, etc. The interactive online board is also useful for project work in mathematics lessons, posting the results of STEM projects.

## 2. Tournament-based team training.

One of the most used applications that allow you to organize both individual and team competitions in lessons is Kahoot. This resource allows you to conduct an online quiz using a question slide, the student's phone number as an "answer form", as well as a point system for evaluating the answer. The Kahoot service allows you to choose one of two forms of the task - a question with the number from 1 to 4 correct answers or a question with two "True/False" answer options. It can also be used to organize team competitions.

At the end of the test, you can see the rating and the points received by the participants, which will demonstrate the level of preparation of each student and the teams.

3. Individual work in a team. It can be successfully used in mathematics lessons starting from the 3rd grade. In this case, the class is divided into teams, each of which performs an individual task, and the captain chosen in the team can indicate the fate of each team member's participation in the joint result. This technology is the basis of the Scrum approach in education, the basics of which students can familiarize themselves with in junior high school.

A Trello board can be used to record the results of the team, as well as the contribution of each participant.

Trello is a web application that allows you to create planning boards. The task on the board can be marked with a certain marker and commented on. Tasks can be divided into subtasks and the process of their execution can be monitored [4]. Using the application in elementary school requires the participation of parents and the class teacher. However, already in the 4th grade, provided that the application is used in the younger grades, students can successfully use it in their educational activities.

4. Saw. It is used when the educational material can be broken into fragments in a natural way. Moreover, their number should match the number of group members. Each of the children is appointed to be responsible for his part of the educational content. His task is to study himself and help others understand the material. After the children return, the teacher discusses the results with the class. This method can also be used by giving different topics not within one group, but one specific topic per group. Then, after work, the children choose a speaker who will explain this part of the material to others (Pedahohika spivrobotnytstva, 2021).

This technique can be implemented by dividing children into groups on the Zoom platform.

You can also involve children in solving tasks together by giving students the right to control the mouse during the on-screen demonstration of the solution to the exercises on the LearningApps or H5P platform. This will give students a sense of "presence" despite the distance format. Let's emphasize the advantages of the first resource, since its functionality includes many already developed exercises from the elementary course of mathematics (numbering of non-negative integers, arithmetic operations of addition, subtraction, multiplication, division, ordinary proper fractions, etc.); availability of a sufficient number of platforms for the diversification of interactive exercises; the possibility of attractive design of interactive exercises with the help of drawings, graphs, diagrams, audio and video materials, etc.; presence of animations, dynamism and special effects in interactive exercises; the possibility of developing differentiated exercises according to levels of difficulty; the possibility of submitting a series of interactive exercises by levels of advancement; clear and simple algorithm for performing interactive exercises (Rudenko N.M., 2020).



It is also worth noting special mathematical sites and applications that can significantly motivate students to solve mathematical problems, visualize content and develop key competencies of students. They can also be used when organizing cooperation in mathematics lessons in elementary school.

These resources include:

1. Mathdisk (<http://www.mathdisk.com/>) – mathematical interactive designer.
2. Matifik (<https://www.matific.com/ua/uk/home/>) – a digital math platform developed by education experts.
3. Mozaik Education (<https://ua.mozaweb.com/>) – a platform that contains digital textbooks with 3D animations, educational videos and exercises.
4. Pustunchik (<https://pustunchik.ua/ua/>) – children's interactive portal.
5. Vchy.ua (<https://vchy.com.ua/>) – children's educational gamified portal for interactive learning of mathematics for children (grades 1-6) with the help of interesting game tasks and tasks.
6. Geogebra (<http://www.geogebra.org/>) – site of the system of dynamic computer mathematics for the study of models of spatial figures.

It should be noted that the given list is not exhaustive, because applications aimed at studying school subjects are constantly appearing.

In general, such initiatives of the teacher in remote lessons have a very positive effect on the general level of preparation of children for real life, and allow them to be educated at an early age in their natural environment - information and digital technologies, which over time can determine their future profession, but definitely will not become redundant in adulthood. Today, this concept includes digital hygiene, personal data protection, moral behavior in the digital environment, the basics of handling computer equipment, etc. (Kateryniuk Kh., 2021).

The growing role of ICT in education and the everyday life of teachers and primary school students requires the formation of digital literacy. This process is entrusted to the teacher as the main agent of action and engine of modern reforms. This implies a clear understanding not only of the components and features of this category, but also of forms, methods and tools that contribute to the acquisition and further development of digital competence of all participants in the educational process.

#### CONCLUSIONS AND PROSPECTS OF FURTHER RESEARCH

Thus, the organization of educational cooperation in a digital educational environment in mathematics lessons in elementary school involves such interaction between the teacher and students, students among themselves in an educational situation, during which there is a restructuring of children's established methods of action, the formation of components of educational activity (that is, the ability to learn). The organization of such activities requires a high level of digital competence of teachers, which includes both knowledge of the didactic basics of the lesson in the distance form of learning, and the ability to use various software tools and applications. By offering work with digital educational resources, the teacher builds information literacy in students, introduces them to useful services, motivates students to work in lessons. One of the advantages of using digital technologies in teaching mathematics is due to their potential for actively involving students in the learning process and managing it.

The author sees the prospects for further scientific research in the study of international experience in the practical use of digital tools in elementary school classes. Today, joint approaches and the creation of favorable conditions for the use of digital tools by teachers in order to improve their qualifications require special scientific support.

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