The role of school projects in the professional interaction of teachers in the organization of inclusive education of students

El papel de los proyectos escolares en la interacción profesional de los docentes en la organización de la educación inclusiva de los estudiantes

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Abstract
The article aims to substantiate the professional interaction of pedagogical workers in the "teacher-student" system based on the use of the capabilities of the electronic educational environment for online cooperation with students involved in inclusive education in combination with offline classes. It is shown that, based on the use of technical capabilities of Google meet, a joint online discussion of problematic issues that arise for schoolchildren involved in inclusive education during their research activities is ensured. The role of elementary school teachers during the organization of project work of junior high school students, taking into account their age capabilities, is revealed. The role of elementary school teachers during the organization of project work of 5-6 grade students involved in inclusive education, taking into account their independent work, is revealed.

Keywords
Teaching method innovations, Team teaching, Blended learning, Competency based teaching.
Resumen

El artículo tiene como objetivo fundamentar la interacción profesional de los trabajadores pedagógicos en el sistema "docente-estudiante" basándose en el uso de las capacidades del entorno educativo electrónico para la cooperación en línea con estudiantes involucrados en la educación inclusiva, en combinación con clases presenciales. Se muestra que, basándose en el uso de las capacidades técnicas de Google Meet, se garantiza una discusión en línea conjunta de cuestiones problemáticas que surgen para los escolares involucrados en la educación inclusiva durante sus actividades de investigación. Se revela el papel de los docentes de educación primaria durante la organización del trabajo por proyectos de los estudiantes de primaria, teniendo en cuenta sus capacidades por edad. Se revela el papel de los docentes de educación primaria durante la organización del trabajo por proyectos de los estudiantes de 5º y 6º grado involucrados en la educación inclusiva, teniendo en cuenta su trabajo independiente.

Palabras clave: Innovaciones en métodos de enseñanza, Enseñanza en equipo, Aprendizaje combinado, Enseñanza basada en competencias.

Theoretical and applied aspects of basic principles of organizing school-wide projects

For the professional interaction of pedagogical workers in the "teacher-student" system in conditions of mixed learning, it is advisable, in our opinion, to use the possibilities of the electronic educational environment for cooperation with students online in combination with offline classes. For this purpose, the administration of the educational institution organizes a creative group of teachers, which includes primary and basic school teachers. The coordinator (tutor) is the head of the creative group. On the page of the website of the educational institution in the electronic educational environment in the GSuite for Education system, Google Classes of elementary and basic school students who have a desire and interest in participating in school-wide projects are created. Based on the use of the technical capabilities of Google meet, a joint online discussion of problematic issues that arise for schoolchildren involved in inclusive education (mental retardation, infantile cerebral palsy, speech disorder) during their research activities is provided. School-wide projects provide for the solution of a number of didactic tasks: increasing the motivation of participants in the educational process for research activities, the formation of research competencies among teachers and students, modernization of the educational environment, solving socially significant tasks within the educational institution. In addition to didactic tasks, general school projects create conditions for the implementation of a number of areas of professional interaction of pedagogical workers within the educational institution. Short-term projects (with a duration of up to two months) with an integrative content can be chosen as school-wide projects for the purpose of solving practical tasks. Therefore, in our opinion, it is appropriate to develop educational modules in an
electronic educational environment and ensure their didactic content by members of the creative group of teachers.

Stages of professional online interaction of elementary and basic school teachers
Let's consider in more detail the stages of professional online interaction of elementary and basic school teachers based on the analysis of the stages of implementation of a short-term school-wide project as an extracurricular partnership activity of students in inclusive education and teachers. The first educational module of the short-term general school project consists in choosing the topic of the project and its type. According to the classification of types of projects proposed in the research of M. Romanovska¹, a general school project can be an entrepreneurial, design, social, international Internet project, etc. In our opinion, for the formation of research competences of teachers and students, in inclusive education, it is advisable to choose such a topic of the school-wide project, which will ensure the integration of the above types of projects to achieve a single goal - to modernize the educational environment based on the practical implementation of the project. The main goal of the members of the creative group of teachers at this stage is to maximize students' interest in project activities and generate ideas for all participants in the educational process. Accordingly, in the students' Google Classrooms, teachers who are part of the creative group place the first task: to propose a topic for the school-wide project. Pedagogical workers summarize the suggestions of students in inclusive education that they have posted on their electronic pages. In order to choose a common research topic, students' and teachers' ideas are discussed during a meeting in Google meet. The second educational module of the short-term school-wide project consists in the development of the project in accordance with the chosen topic, for example, "School library" which can be find in Fig. 1.

Fig. 1 Project "School library"
Source: author's picture

¹ Романовська, М. Метод проектів у навчальному процесі (методичний посібник) Х.: Веста, 2007.
The role of elementary school teachers in the "teacher-student" system during the organization of project work of junior high school students consists in adapting the project tasks to the age and psychological and pedagogical characteristics of children in grades 1-4, in inclusive education, their level of knowledge and skills: the development of the project design should be strong understanding of the child and have an integrative content, that is, to provide for the demonstration of knowledge by students from various educational fields. Accordingly, groups of elementary school students in inclusive education are offered the following task at this stage: to prepare a models, drawings or photographs that demonstrates the final result of the project which can be find in Fig. 2.

![Fig. 2 Making a model of the "School Library" by a group of students in inclusive education (elementary grades)](source: author's photo)

The role of basic school teachers in the "teacher-pupil" system during the organization of project work of 5-6 grade students in inclusive education consists in choosing project tasks in such a way that students consider designing as the main type of their cognitive activity, rethinking the role of knowledge in social practice: knowledge not an end in itself, but necessary means that ensure the ability to build strategies and make decisions. Therefore, groups of students in inclusive education are offered to display project ideas through 3-D modeling based on the use of modern computer programs. Online interaction of elementary and basic school teachers based on Google meet consists in summarizing and analyzing the results of tasks performed by students of grades 1-4 and 5-6, forecasting the further strategy of developing school-wide projects at the next stage, based on the formative evaluation of research competencies demonstrated by students when performing the above-mentioned tasks. The role of the tutor at this stage is to adjust the directions of the teachers' work on the project, taking into account the current regulatory documents regarding the creation of a modern educational environment. The module contains tasks that involve finding the cost of the components included in the project. The content of the tasks should be selected by teachers taking into account the levels of students' in inclusive education knowledge of information technologies. The role of elementary school teachers during the organization of the project work of
junior high school students at this stage is to adapt the project tasks to the age capabilities of the students: finding the cost of those furniture that can be rationally used in the proposed project model, using websites to search for information about the price of individual items. The role of basic school teachers during the organization of project work of 5th-6th grade students in inclusive education is to choose tasks in such a way that they reflect the independent work of students as much as possible: based on the use of search sites, find the cost of furniture, computer equipment, which were offered by them in developed models. The online interaction of elementary school and basic school teachers based on Google meet at this stage is not only to control the results obtained by groups of students, but also to identify typical problems and mistakes faced by students; determining which groups of skills they have insufficiently developed; planning for further adjustment of students' research competences during class activities. Teachers determine the level of formation of the components of the students' research competencies, based on the criteria for the formative assessment of abilities and skills of schoolchildren. The skills of students in inclusive education defined in the Certificate of Educational Achievements of Primary School Students\(^2\), in the Certificate of Educational Achievements of Basic School Students\(^3\). The requirements for determining the levels of formation of students' practical skills in inclusive education are adapted and modified in accordance with the above-mentioned documents. The tutor's role at this stage is to adjust the directions of teachers' work on the project, taking into account the requirements for the stages of its development and implementation.

The fourth educational module provides for the preparation of students for a public speech, taking into account their age characteristics, and conducting explanatory and organizational work regarding the participation of schoolchildren in voting. The role of elementary school teachers during the online preparation of groups of students of 1-4th grades in inclusive education to defend projects based on presentations is to provide assistance to students and focus their attention on formulating conclusions based on information obtained during research. The role of elementary school teachers during the preparation of groups of 5-6th grade students in inclusive education for defense and their formative assessment during their performance is to focus students' attention on the results of work on the project in the form of tables, diagrams, developed 3-D models. Online interaction of elementary school and basic school teachers based on Google meet at this stage involves the preparation of student teams to participate in debates: the formation of students' skills not only to present the results of their work, but to answer questions from other students

\(^2\) МОН оновило свідоцтва досягнень для 1-2 та 3-4 класів – дивіться документи.


\(^3\) Про затвердження методичних рекомендацій щодо оцінювання навчальних досягнень учнів 5-6 класів, які здобувають освіту відповідно до нового Державного стандарту базової середньої освіти, http://surl.li/ixez
in inclusive education. The tutor's role at this stage: summarizing the students' proposals based on the projects developed by them; maximum consideration of rational ideas of students of both elementary grades and basic school; providing recommendations to students and teachers regarding the improvement of projects; involvement of representatives of public organizations and charitable foundations in the online discussion of projects. In the online preparation of students in inclusive education for research activities within the framework of the school-wide project, priority is given to the formation of elementary information and informatics skills in elementary school students and information and informatics skills in elementary school students. However, in our opinion, it is important to take into account the psychological and pedagogical features of the organization of the process of forming the research competences of primary and basic school students, since it is important to focus on the needs of the student in inclusive education in the educational process, child-centeredness. The formation of research competences among schoolchildren is based, first of all, on their psychological readiness to conduct research. The educational activity of teenagers in inclusive education involves involvement in solving general tasks, which is implemented most effectively during participation in practical activities which can be find in Fig. 3.

Fig. 3 Making a model of the "School Library" by a group of students in inclusive education of basic school
Source: author's photo

Compared to younger schoolchildren, teenagers explore a problematic situation in a different way: they try to reveal all possible combinations in order to choose the true ones and reject the false ones. In addition to the ability to solve problems, adolescents have the opportunity to find them and formulate them: a non-standard approach to already known problems, the ability to include individual problems in more general, generic ones, posing more general questions. For teachers to organize the research activities of 5th-6th grade students, it is important to know the psychological foundations of the transformation of aptitudes into abilities: the combination of mental (theoretical) and practical activities of schoolchildren, the constant solving of various,
complex practical problems, as well as observing how the development other
students in inclusive education do similar tasks. Accordingly, the choice of the
content of practical tasks by primary school and basic school teachers within
the framework of the school-wide project requires taking into account not only
the online training of schoolchildren, but also their involvement in practical
educational activities taking into account their age-related psychological and
pedagogical characteristics. **Stages of professional offline interaction of
elementary and basic school teachers**

Let us consider, in the conditions of mixed learning, the professional offline
interaction of primary and basic school teachers for the purpose of organizing a
short-term school-wide project, in which students of the 1st-4th and 5th-6th
grades are involved, which involves the implementation of a number of stages
based on the practical group activity of students in inclusive education. At the
first stage, groups of students are offered to produce not a virtual, but a real
model of the design project, which reflects the placement of its components in
space, taking into account the geometric dimensions and the total given area.
The role of elementary school teachers during the preparation of a practical task
for younger schoolchildren in inclusive education: to adapt it to the age
characteristics of children, taking into account the criteria of formative
assessment to the abilities and skills of students, determined for the educational
fields "Design and technology", "I explore the world": planning the sequence of
manufacturing the product and makes it; distinguishes man-made objects from
natural and artificial materials. Accordingly, among the tasks for junior high
school students in inclusive education, teachers can choose the following: on
the basis of the presentations developed by junior high school students, during
the online implementation of educational modules in the electronic educational
environment, make a model that demonstrates the practical implementation of
the proposed ideas, using cardboard, colored paper, scissors, glue, paints,
printouts of auxiliary drawings, Lego constructor which can be find in Fig. 4.

![Image](https://via.placeholder.com/150)

**Fig. 4** A model from a Lego constructor, made by younger schoolchildren
in inclusive education
Source: author’s photo

The role of elementary school teachers is to prepare a practical task taking into
account the criteria of formative assessment for the abilities and skills of 5th-6th
grade students in inclusive education, determined for the educational fields
"Technology", "Learning about nature": designs and manufactures products,
processes and uses information. Accordingly, among the tasks for elementary
school students, teachers may offer the following: using 3-D models of the design project, prepared during the online implementation of educational modules in the electronic educational environment, to make sketches based on the template provided by the teacher, which contains the plan of the room, or drawings, and reflects the final vision of project implementation with the indication of the relevant components of the educational environment - zoning of space, determination of furniture sizes which can be find in Fig. 5.

Fig. 5 Making a plan of the "School Library" by a group of students in inclusive education of basic school
Source: author's photo

Students in inclusive education must take into account the dimensions of the furniture indicated by the teacher in the drawing according to the developed model, place them in the room for which the width, length, location of windows, doors are indicated. The professional offline interaction of primary school and basic school teachers consists in the joint choice of directions of students' research activities, which allow them to complement each other and ensure continuity in the formation of the components of schoolchildren's research competencies, among which is the support of students' educational progress; fostering a child's self-confidence through increasing emphasis on his strengths rather than mistakes. For elementary school students in inclusive education, due to preliminary preparation for research activities based on the performance of educational module tasks in an electronic educational environment, there is a gradual transition from elementary skills of a practical nature (use of the simplest equipment, aids) to elementary design and technological skills (creative modeling of products, creative use of materials to implement own ideas, etc.).

For elementary school students in inclusive education, the preliminary completion of online tasks of the educational module in an electronic educational environment creates conditions for improving their skills: based on basic skills of a practical nature (identifying mathematical dependencies in a

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research task, solving practical problems), forming more complex skills - basic project - technological skills (manifestation of imaginative, spatial, design and technical thinking). At the second stage, groups of students are offered to draw up a general estimate of the project they have developed. The role of primary school teachers during the preparation of a practical task for younger schoolchildren is to adapt it to the age characteristics of children, taking into account the criteria of formative assessment to the abilities and skills of students.

The criteria are defined for the educational field "Mathematics": reads and writes down mathematical expressions; analyzes the text of the problem, justifies the solution method. Accordingly, among the tasks for younger schoolchildren in inclusive education, teachers can choose the following: find the total amount of funds necessary for the implementation of the project. The role of elementary school teachers is to prepare a practical task taking into account the criteria of formative assessment for the abilities and skills of 5th-6th grade students, determined for the educational field “Mathematics”: working out problem situations and creating mathematical models; critically evaluates the results of solving problem situations.

Accordingly, among the tasks for elementary school students in inclusive education, teachers can offer the following: taking into account the total amount of funds allocated for the implementation of the project, develop its estimate; specify the list of furniture, computer equipment, their cost, provided that the funds for their purchase do not exceed the maximum allowable value. It should be noted that the content of the tasks should be selected by teachers taking into account the levels of mathematical training of primary and basic school students. The professional offline interaction of elementary school and basic school teachers at this stage consists in the joint selection of the integrative content of tasks (mathematics - the foundations of economic knowledge), the solution of which creates conditions for ensuring continuity in the formation of the constituent research competencies of schoolchildren.

For elementary school students in inclusive education, due to preliminary preparation for research activities based on the completion of the tasks of the educational module in the electronic educational environment, the connection between elementary experimental skills (recognition of practical problems, use of formulas for calculations) and elementary information and informatics skills (processing of textual and graphic information). For elementary school students in inclusive education, the preliminary completion of online tasks of the educational module in an electronic educational environment creates conditions for ensuring continuity in the formation of experimental skills, basic information and informatics skills in students of 5-6th grades. At the third stage, groups of students are offered participation in debates in order to present the projects developed by students. Teams of elementary school students and basic school students in inclusive education need to present final models of project activities that reflect their ideas, work and an appropriate budget for practical implementation. Teachers organize parallel debates (among groups of students
of the same age category) in order to ensure the maximum psychological comfort of schoolchildren. After the debate, a school-wide vote is organized for the student projects developed by each team to determine the winners.

The role of elementary school teachers at this stage is to determine, in accordance with the criteria of formative assessment (logical justification of one's opinion, demonstration of ways of solving problems, evaluation of the result of one's work), the level of formation of elementary generalized experimental skills in schoolchildren in inclusive education. The role of basic school teachers at this stage is to determine, in accordance with the criteria of formative assessment (expression of one's own opinion, critical and systemic thinking, logical justification of one's position, risk assessment, independent decision-making, problem solving), the levels of formation of students of basic generalized experimental skills.

The professional offline interaction of elementary school and basic school teachers at this stage consists in the joint determination of the quality of pedagogical activity regarding the organization of research work of schoolchildren, which is reflected in the quality of research competences of students: the effectiveness of their performance of tasks during independent research, establishment of relationships (for elementary school students in inclusive education); solving integrative tasks that involve demonstrating knowledge from several academic disciplines; demonstration of critical and creative thinking abilities and skills, including digital (for basic school students in inclusive education). It should be noted that ensuring the continuity of quality education during the transition of students from elementary to basic school is implemented by pedagogical workers through the choice of common technologies, forms and methods of teaching schoolchildren.

Thus, the result of interaction between elementary and basic school teachers and students who are involved in inclusive education can be a socially useful project - "School library" which can be find in Fig. 6.

![Fig. 6 Results of work on a joint project "School library"](image-url)
Analysis of the obtained results of the project for a group of elementary school students in inclusive education

In order to objectively evaluate the effectiveness of the cooperation of teachers and students involved in joint project activities, we will analyze the dynamics of the levels of formation of the skills of schoolchildren. To do this, we will consider the results that were obtained before the implementation of the project for a group of elementary school students (12 students) in inclusive education which can be find in tab. 1 and at the Fig. 7.

Table 1
Levels of formation of research competences of elementary school students (12 students) in inclusive education before project

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Fig. 7 Diagrams of levels of formation of research competences of elementary school students in inclusive education before project

The most developed at the average and high levels are, respectively: elementary experimental skills (41.65% - for 5 students), elementary information and informatics skills (in 49.98% - for 6 students and 24.99% - for 3 students), elementary generalized experimental skills (6 students - 49.98% and 2 students
- 16.66%). The potential for further formation of students' research competences is project-technological skills (58.31% - 7 students). Note that the components of the experimental skills of students of elementary school in inclusive education indicated above have a complex hierarchical structure. They provide for a gradual complication: from elementary skills of a practical nature to generalized experimental skills. Each subsequent skill assumes the formation of previous skills at a certain level. Accordingly, generalized experimental skills are the highest in the proposed structure of students' in inclusive education research skills. They provide for the combination of practical skills with students' theoretical knowledge: the ability to generalize, establish cause-and-effect relationships.

We will consider the results that were obtained after the implementation of the project for a group of elementary school students (12 students) in inclusive education which can be find in tab. 2 and at the Fig. 8.

**Table 2**
Levels of formation of research competences of elementary school students (12 students) in inclusive education after project

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![Fig. 8 Diagrams of levels of formation of research competences of elementary school students](image-url)
school students in inclusive education after project
The results obtained after the completion of the project allow us to state that the following skills of students are the most developed at a high level: elementary project-technological skills (58.33% - for 7 students), elementary experimental skills (50.00% - for 6 students), elementary information and informatics skills (58.33% - for 7 students). The obtained results are higher compared to what was indicated at the beginning of the students' implementation of the project. This indicates a positive dynamic in the formation of research skills of elementary school students in inclusive education.

Analysis of the obtained results of the project for a group of basic school students who in inclusive education

We will consider the results that were obtained before the implementation of the project for a group of basic school students (14 students) who are involved in inclusive education which can be find in tab. 3 and at the Fig. 9.

Table 3
Levels of formation of research competences of basic school students (14 students) in inclusive education before project

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Fig. 9 Diagrams of levels of formation of research competences of basic school students (14 students) in inclusive education before project 
For basic school students before the implementation of the project, the most formed at the middle and high levels are, respectively: basic information and informatics skills (in 57.12% - in 8 students and 28.56% - in 4 students), basic generalized experimental skills (in 49.98% - in 7 students and 42.84% - in 6 students). Note that the research skills of basic school students in inclusive education have a complex hierarchical structure. The skills gradually become more difficult from basic practical skills to basic generalized experimental skills. Basic generalized experimental skills of elementary school students are more complex compared to elementary generalized experimental skills of elementary school students. This is explained by the fact that elementary school is propaedeutic for basic school.

We will consider the results that were obtained after the implementation of the project for a group of basic school students (14 students) who are involved in inclusive education which can be find in tab. 4 and at the Fig. 10.

Table 4
Levels of formation of research competences of basic school students (14 students) in inclusive education after project

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basic generalized experimental skills
basic information and computer skills
basic experimental skills
basic project and technological skills
basic skills of a practical nature
Fig. 10 Diagrams of levels of formation of research competences of basic school students (14 students) in inclusive education after project
For basic school students after the implementation of the project, the most formed at the high and average levels are, respectively: project-technological skills (in 50.00% - in 7 students and 28.56% - in 4 students), basic information and informatics skills (in 57.14% - in 8 students and 28.56% - in 4 students), basic generalized experimental skills (in 64.29% - in 9 students and 28.56% - in 4 students). This indicates a positive dynamic in the formation of research skills of basic school students in inclusive education.

Conclusion
The quality of education has a complex hierarchical structure and includes such concepts as "quality of pedagogical activity", "quality of pedagogical process", "quality of student competences". For high-quality pedagogical activity, the following interrelated types of teacher activity are distinguished: diagnostic, organizational-prognostic, constructive-projective, organizational, informational-explanatory, communicative-stimulatory, analytical-evaluative, research-creative. The specified types of activities are reflected in the joint and individual work of elementary and basic school teachers at the stages of organizing student in inclusive education research and their implementation of school-wide projects.

Pedagogical activity has common components with the pedagogical process: control, formative assessment, correction of students' competencies, choice of learning technologies. Since pedagogical activity is a more general concept in terms of content, compared to the pedagogical process, and contains common components with it, the pedagogical activity includes the pedagogical process in its structure and is, compared to it, at a higher hierarchical level. The choice of a single technology (project activity) for teaching students of grades 1-4 and 5-6 creates conditions not only for improving the "quality of pedagogical activity" and "quality of the pedagogical process", but also ensures the continuity of quality education when students transition from primary to basic school.

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Про затвердження методичних рекомендацій щодо оцінювання навчальних досягнень учнів 5-6 класів, які здобувають освіту відповідно до нового Державного стандарту базової середньої освіти. http://surl.li/ifxez