



**ҚАЗАҚСТАН РЕСПУБЛИКАСЫ
БІЛІМ ЖӘНЕ ҒЫЛЫМ МИНИСТРЛІГІ**

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**«Қозыбаев оқулары – 2019: Рухани жаңғыру және қазіргі
әлемдегі ғылыми білім беру кеңістігінің даму үрдісі» атты
халықаралық ғылыми-тәжірибелік конференцияның**

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**международной научно-практической конференции
«Козыбаевские чтения - 2019: Духовная модернизация и
тенденции развития научно-образовательного пространства
в современном мире»**

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МАТЕМАТИКА ЖӘНЕ ЖАРАТЫЛЫСТАНУ ҒЫЛЫМДАРЫ САЛАСЫНДАҒЫ ЖАҢА ТЕХНОЛОГИЯЛАР НОВЫЕ ТЕХНОЛОГИИ В ОБЛАСТИ МАТЕМАТИКИ И ЕСТЕСТВЕННЫХ НАУК

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DEVELOPMENT OF SCIENCE COMPETENCE THROUGH PROJECT ACTIVITIES

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In the context of updating the educational content the development of functional competence of school children is defined as one of the priority aims of education[1]. The basic requirement for the modern educational content is students' achievement of a certain level of functional— both reading, mathematics and science— competence which shall be formed by each school subject using techniques and methods that form the ability to independently gain new knowledge, to collect necessary information, to put forward hypotheses, to draw conclusions and to make inferences.

Project activities of students include educational, cognitive, creative and game activities, the result of which is the solution of any problem, presented in the form of its detailed description (project). The method of projects (from the Greek word "way of research") is focused on the creative self-realization of the individual in the process of independent work of students under the guidance of the teacher starting from the idea of the project and to its implementation[2].

Using the method of projects in the educational process provides the formation of key competencies: research, communicational and informational[3].

If delving into the history of the method, it is not fundamentally new in the world of pedagogy, but today it is referred to pedagogical technologies of the XXI century as a method that provides the ability to adapt to a rapidly changing world. The method originated at the beginning of the last century in the United States and it is also called the method of problems. The theoretical basis of the project method is the "pragmatic pedagogy" of the American idealist philosopher John Dewey (1859-1952). Conditions for the success of training according to the theory of D. Dewey are: problematization of educational material; cognitive activity of the child; connection of learning with the child's life experience and organization of learning as an activity (playing, working)[4].

This method involves solving an interesting problem formulated by the students themselves. The method of projects as a pedagogical technology is a technology that involves a set of research, search, problem methods, creative in their essence. For the student himself the project is an opportunity to maximize his creative potential.

However, this method was first used in practice much earlier the publication of the famous article "Project Method" by V.H. Kilpatrick's (1918), where he defined this concept as "the plan performed from the heart". In Russia, the project method has been known since 1905 when a group of Russian educators under the leadership of S. T. Shatsky was integrating it into educational practice. The development of the project method in Russian schools is also connected with the names of such teachers as V.N. Shulgin, M.V. Krupenin, B.V. Ignatiev, and others. Teachers of the 20s of the last century believed that the method of projects brings diversity in educational activities and in development of interest in learning, stimulates students to creative search, independent research and transformation; it promotes education initiative, collectivism, development of skills and planning and organization of labor, distribution of forces and means, etc.

After the revolution, this method was used in schools by personal order of N.K. Krupskaya. The content of the training projects had to be socially useful things for teenagers and children (for example, the project "Let's help our patronage plant to carry out the financial plan". Meanwhile, one-sided enthusiasm for projects to the detriment of the overall development of an individual has led to the fact that the level of general education of children has declined sharply. In 1931, according to the decision of the Central Committee of the All-Union Communist Party of the Bolsheviks method of projects was condemned as alien to the Soviet school.

It was revived in the system of domestic school education in the early 90-ies of the last century. This happened with the introduction of information technologies in the learning process. To a greater extent the method of projects was used in teaching students a foreign language. The typology of the projects and the features of the technology of its application were presented by E.S. Polat in the textbook "New Pedagogical and Information Technologies in the Education System"[5, 6].

Over time, the idea of the project method has undergone some evolution. Having emerged from the idea of free education, it is now becoming an integrated component of the developed and structured education system. Still, the essence of it remains the same – that is to stimulate children's interest in certain problems, involving the possession of a specific amount of knowledge and to show the practical application of the acquired knowledge involving the solution of one or a number of problems through project activities.

In the modern information society, the method of projects becomes of particular relevance. In recent years, there has been an increased interest in this form of training in the domestic education.

The method of projects is a set of research, search and problem methods, creative in their essence, aimed at solving the problem formulated by the students themselves. For the student, the project is an opportunity to maximize their creative potential[7].

The main thesis of the modern understanding of the method of projects says: "I know why I need and where and how I can apply all the knowledge that I learn"[8]. Application of this technology in the process of geography study allows developing of many components of educational activities such as creative activities, rational thinking and emotional, theoretical and practical understanding of the world. The content of school geography has extensive capabilities in application of project technology which include implementation of regional and local component, forming of ecological culture and creative and research skills of students, ability to conduct a practical experiment, social significance, and also close connection with other science subjects.

Implementation of project activities in the study of geography has a long-term nature, is implemented in phases and begins with selection of a research topic at the beginning and defense of the project at the end of the school year.

The first stage of the project cycle is value-oriented. Here students understand the motive and objectives of their subject activity, define priority values which would serve the base of the project and determine the project idea [2].

The second stage is constructive and includes the project development itself. At this stage students carry out project activities. This means that they make a plan, choose and study required literature, find information on the studied problem in the framework of the project, and choose the form of the project implementation. This stage is one of the main and important stages of students' project activities.

The third stage is evaluative and reflective. It is based on students' self-evaluation of their activities. This stage includes the layout and design of the project, its preparation for presentation and protection. There can be carried out a correction of the project on the basis of reflection.

The fourth stage is presentational, where the defense of the project takes place. Presentation is the result of the work of different groups and of individual activities; it is the outcome of collective and individual work [5, 9].

Projects can be both made individually and in groups. Working in a variety of composition and profile groups allows students to practice the "art of communication", and an experience has proven that it is not easy.

The main requirements for the use of the project method are the significant problem that requires integrated knowledge and research solutions; theoretical, practical and cognitive significance of the expected results; independent (individual, pair, group) activities of students; structuring the content of the project (indicating the phased results); the use of research methods (identification of the problem and the resulting research problems, the developing of hypotheses for their solutions, discussion of research methods, presentation of the results, analysis of the data, conclusions) [10, 11].

An important role in arrangement of project activities of students is the ability of a teacher to determine the type of project and its priority area and to define respectively goals, content and methods of the project implementation. Implementation of project activities begins with selection of a topic of the future research project. In our practice of writing projects there used to be both individual and group projects. In that case the project is a group one, each student must clearly show his contribution to the project.

Definition of a research topic is a very important stage; the topic of the project must be relevant and applicable. When choosing a topic, it is important to justify its relevance. The relevance of the chosen topic should justify the need for research, the results of which will solve certain scientific and practical problems. It is important that the project is aimed at the practical solution of technical and social problems and benefits society. In choosing a topic, the teacher should take into account, first of all, the interests of the student. The idea of the project shall be considered together with the student, and then the topic of the project is corrected. It should show the peculiarity, uniqueness and the fundamental advantage of the project.

When organizing project activities, it is necessary to take into account the age characteristics of students.

There are a lot of interesting natural, socio-economic objects, phenomena and processes in geography that can be the object of study in the project activities of students. It is more preferable if the student will determine the actual up-to-date topic himself. If he takes the initiative, the subject needs to be close to him and be the field of his (not the teacher's) interest. The task of the teacher at this stage is to help him make an informed choice, to show the importance of the chosen topic, both personally and in a social context.

After choosing the topic there is a stage of making a hypothesis of the study, definition of goals and objectives and choice of both theoretical and empirical methods and techniques of the research.

The construction of hypotheses is the basis of research and creative thinking of students. The hypothesis of the study is a detailed assumption that details the model, methodology and the system of measures that is the technology of the innovation, as a result of which the goal of the study is expected to be achieved. There can be several hypotheses – some of them will be confirmed, some will be not. During the experiment, the hypothesis shall be corrected, supplemented, developed or rejected. Students often express a variety of hypotheses about what they see, hear or feel. Many interesting hypotheses are born as a result of trying to find answers to their own questions.

The teacher must help the student to formulate the goals of the study and to set tasks in the upcoming work together with him.

When determining the goal of the scientific project, it is advisable to form a specific, qualitatively and, if possible, correctly quantitatively characterized image of the desired (expected) result, which can actually be achieved by a clearly defined point in time.

The task is a step, a link, a stage of a goalachievement: generalization of results, finding of the common patterns by processing and interpretation of experimental data; expansion of results of the research on a number of non-recurring similar objects of all the scope of the research; and increase of reliability of the experimental research of the object. This is a consistent proof of the hypothesis put forward. Moreover, if the goal of the study is determined by the general state of the problem under study, the logical tasks of the study follow from the goal of the study and taking into account the requirements of practice.

The object of the research is an area in which a set of relationships, interactions and properties are studied as a source of necessary information for the researcher.

The subject of the research is more specific and includes only those connections and relations which are subject to direct studying of the work; it establishes borders of scientific search in each object. The subject is always studied within an object.

In order not to evade the chosen topic, it is necessary to clearly and accurately imagine the goal and objectives of the study. Their definition will allow the student to collect information more economically and with greater determination and process it.

At the initial stage, children often have difficulties with drawing up an individual project plan, formulating their thoughts, language difficulties in presenting the material. And here a teacher should come to the help: his role is to be a coordinator, participant and assistant. It is desirable to work with students to outline the structure of the work, identifying the main points that can be expanded by the student during the research, adding new ones.

One of the important elements of the work is the definition of literary sources. Students shall not just be sent to the library, where he will be looking for appropriate books and articles for a long time; it is better to name a few works to which the student must necessarily refer to when doing the research, to set him the task of compiling a list of literature according to the library catalog and then select the necessary books with him.

An important stage of a research is to study theoretical material on the research topic. When composing projects we use such theoretical research methods as analysis and synthesis of scientific literature on the research topic. Students study the topical issue from different sources such as scientific literature and periodical press including possibilities of the Internet. At this stage of study a student learns independent and systematic work with different information sources: choosing the essentials, comparing, drawing conclusions, assessing the subject and identify causal relationships.

In addition to theoretical methods we widely use empirical ones. A very important stage in the study is an experiment which takes most of the project time. The conducted experiment

shall confirm or deny the initially set hypothesis. For example, when writing the research project on snow cover as an indicator of environmental conditions in the city, we used such methods as snow sampling in different parts of Petropavlovsk, preparation of melt water for analysis, chemical analysis and determination of organoleptic properties of the melt water, bioindication, observation of the experiment, measurement, comparison and processing of the experiment results. The whole empirical phase of the study shall be accompanied by photos and videos. They are included as illustrative materials when defending projects and can be used in creating wall newspapers and brochures. It is the most interesting stage for students because here they are direct creators and observers.

When analyzing the results of the experiment the students apply methods of mathematical statistics building comparative graphics, charts and tables.

In addition, when writing projects we widely used such method as a questionnaire survey; depending on the project topic the respondents of such a sociological survey, both oral and in writing, were students, teachers, residents of households, buyers of different shops, etc.

The teacher should put clear deadlines for the student, breaking the work into several stages. Thus, it will be easier for the student to plan his activities.

It is quite useful to address the Internet. This will help to organize the work with different types of information, to develop skills in dealing with computer technology. It is there that the student will be able to easily find not only a certain part of the necessary information, but also illustrations for his work. It is important that the student's work even in the abstract version contains illustrations. This will help students develop the ability to map a visual image to text.

Among other things, we want to draw the teacher's attention to the importance of the use of computer technologies in the study. They can be applied both at the stage of search and processing of information, and at the stage of presentation of results of work and at its representation. The student's ability of applying computer technologies will greatly facilitate the work on the study. Students who do not have enough such knowledge will develop the skills of handling multimedia systems.

The teacher shall monitor the student's work at all stages of the study; he shall advise him on all emerging issues, assist in processing the results and determine the compliance of the current stage with the goals and objectives of the entire study.

Evaluation and reflective stage of the research implies that students summarize the performed work, formulate conclusions, prepare printed text of their works where they clarify goal, objectives, relevance, methods, object and subject of the study and theoretical material on the research topic, introduce the practical experiment itself and the results obtained, make recommendations after experimental research, and prepare illustrative materials. It is important to note that aesthetic and creative activities in the framework of the project are inseparable from cognitive research[12].

The most important and responsible stage is presentational. The defense of the project takes place at a school research and practice conference. If their work gets high marks and recommendations for participation at the city round from members of the Commission, the project works are allowed to the following stages of defense. It is important here to single out the essentials and to be able to convey to the audience the essence of the problem and the scientific novelty of our research in the time limit of the defense. At this stage students shall develop public speaking skills, ability to overcome anxiety, to correctly perceive criticism and remarks.

During their speeches they show illustrative material, photos and videos prepared during the experiments. These may be stands, layouts, graphics, crafts, etc.

The teacher shall advise the student concerning the requirements for registration and presentation of the results of the work. In cooperation with the student, the teacher shall work out the form of presentation, as well as provide psychological support to the student at the stage of protection of the project. It is clear that the role of the teacher as a research manager is extremely important and is critical in the organization of project work.

Conclusion

Thus, to sum up the foregoing we can draw the following conclusions – as a result of active implementation of the project method during the study of geography, students acquire:

- educational competence that includes solid knowledge, skills and abilities gained while independently and systematically achieving different goals and involves knowledge of the ways of goal-setting, planning, analysis, reflection and self-assessment of their own activities;
- informational competence which means the experience of thoughtful work with a large amount of information from various sources and the ability to independent search, analysis, selection, processing and transfer of the information required;
- and communicative competence when students acquire the skills of educational cooperation and communication: they learn team work, plan to work individually and in a group, and master the skills of interaction with others. Students form spiritual culture and moral qualities, patriotism, leadership and desire to help in solving a problem in question.

In addition, the method of project activates cognitive activity and motivation of students, increases student success, develops interest in the subject, contributes to the development of creative skills and creative thinking skills, self-development, self-education and self-feeling[3].

During the project the relationship between a student and a teacher changes: more time spent together during the project development comparing to that during classes and joint experience for successful defense of the project unite a teacher and a student. Besides, the project work enables early formation of professionally significant skills of students; the students can identify their aptitudes to future career.

In this connection the method of projects allows to educate independent and responsible personality, develop creativity and mental skills which form necessary qualities of a developed intellect. If a student acquires these qualities, he is more adapted to life, more competitive, able to adapt to changing conditions, to navigate in a variety of situations, to work together in various teams and to successfully carry out professional activities in the global economic space.

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ИНТЕРАКТИВНОСТЬ КАК СРЕДСТВО ОБУЧЕНИЯ ШКОЛЬНИКОВ МАТЕМАТИКИ

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Современная система образования при организации учебного процесса требует от педагога его структуры, форм организации деятельности, принципов взаимодействия субъектов. А это означает, что приоритет в работе педагога отдается совместным поискам истины, разнообразной творческой деятельности. Все это реализуется при применении интерактивных методов обучения.

Слово «интерактив» пришло к нам из английского от слова «interact». «Inter» – это «взаимный», «act» – действовать. Интерактивность – означает способность взаимодействовать или находиться в режиме беседы, диалога с кем-либо (человеком) или чем-либо (например, компьютером) [1]. Таким образом, интерактивное обучение можно трактовать в двух разных аспектах.

Интерактивное обучение – это вид школьной работы или учебного плана, который использует компьютерные технологии для того, чтобы актуализировать освоенный материал. Онлайн-уроки и виртуальные классы являются примерами экстремального интерактивного обучения. Каждый раз, когда компьютер включается в академическое пространство, как средство образовательной игры или как структурированный исследовательский инструмент, урок становится интерактивным.

Концепция интерактивного обучения не является новой для так называемого «поколения технологий» и фактически только недавно стала ассоциироваться с компьютерами. Десятилетия назад любое обучение, которое включало в себя больше, чем просто лекцию и повторение, и ориентировалось на взаимодействие субъектов обучения, считалось интерактивным. Это и есть первый аспект понимания интерактивного обучения.

Интерактивное обучение обычно рассматривается как противоположность пассивному обучению, которое выступает как наблюдение обучающегося за процессом передачи знаний. Учащиеся, как правило, нуждаются в сочетании пассивного и активного обучения для того, чтобы освоить основные идеи. Если все интерактивно, учащиеся рискуют быть чрезмерно возбужденными или потерять след основных целей. Однако, если обучение является полностью пассивным, учащиеся могут обнаружить, что их интерес и внимание снижаются [2].

Учителя обычно стремятся найти баланс между пассивными и интерактивными методами обучения, т.к. эти две системы, как правило, работают лучше всего, когда играют друг против друга.