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TRAINING OF FUTURE SPECIALISTS FOR THE USE OF STEM LABORATORIES IN PRIMARY EDUCATION

Abstract

The article discusses the preparation of future specialists for the use of a STEM laboratory at the initial stage and is based on determining the effectiveness in accordance with the results of research. Scientific papers, state regulatory documents and programs that reveal the content of the topic on the issue of training future specialists to use STEM laboratories in primary education are analyzed. The possibilities of the process of training future specialists to use the STEM laboratory in primary education are determined.

In the preparation of future primary school specialists, the problem of organizing students' research activities at a high level through the development of their creative and intellectual potential is considered. The effective use of the STEM laboratory in primary school, the effectiveness of the implementation of research activities of students in teaching using STEM technology has been established.

In order to reveal the research topic, based on the analyzed scientific papers, special surveys were obtained with the participation of primary school teachers in order to determine the possibility of using STEM laboratory by future specialists in primary education. In addition, as a result of the theoretical differentiation of scientific papers, the content and effectiveness of the use of the STEM laboratory in education are methodically determined in the article, and the possibilities of its' application are analyzed. The features of STEM education in primary grades are determined.

The scientific novelty lies in the interrelated theoretical and methodological consideration of the possibilities of preparing future specialists for the use of STEM laboratories in primary education.

Keywords: STEAM, primary education, primary school specialist training.

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БАСТАУЫШ БІЛІМ БЕРУ ЖАҒДАЙЫНДА БОЛАШАҚ МАМАНДАРДЫ STEM ЗЕРТХАНАСЫН ҚОЛДАНУҒА ДАЯРЛАУ

Аңдатпа

Мақала бастауышта болашақ мамандарды STEM зертханасын қолдануға даярлауға бағытталып, тиімділігін зерттеу нәтижелеріне сәйкес анықтауға негізделген. Бастауыш білім беру жағдайында болашақ мамандарды STEM зертханасын қолдануға даярлау мәселесі бойынша тақырып мазмұнын ашатын ғылыми еңбектер, мемлекеттік нормативтік құжаттар мен бағдарламалар талданған.

Болашақ бастауыш сынып мамандарын даярлауда олардың шығармашылық және зияткерлік әлеуеттерін дамыту арқылы оқушылардың зерттеушілік іс-әрекетін жоғары деңгейде ұйымдастыру мәселесі қарастырылған. STEM зертханасын бастауыш сыныпта тиімді қолдану, оқу мен оқытуда оқушылардың зерттеушілік іс-әрекетін STEM технологиясының көмегімен жүзеге асырудың тиімділігі анықталған.

Зерттеу тақырыбын ашу мақсатында талданған ғылыми еңбектерді негізге алып, бастауыш білім беру жағдайында болашақ мамандарды STEM зертханасын қолдану мүмкіндігін айқындау мақсатында бастауыш сынып мұғалімдерінің қатысуымен арнайы сауалнамалар алынып, қорытындысы шығарылған. Сонымен қатар мақалада ғылыми еңбектерді теориялық саралау нәтижесінде STEM зертханасын қолданудың мазмұны және білім алу мен білім берудегі тиімділігі әдістемелік тұрғыдан айқындалып, оны қолданудың мүмкіндіктеріне талдау жасалған. Бастауыш сыныптардағы STEM білім берудің ерекшеліктері айқындалған.

Ғылыми жаңалығы – Бастауыш білім беру жағдайында болашақ мамандарды STEM зертханасын қолдануға даярлау мүмкіндіктерін теориялық және әдістемелік тұрғыдан өзара байланысты қарастырудан тұрады.

Түйін сөздер: STEAM, бастауыш білім, бастауыш сынып маманын даярлау.

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ПОДГОТОВКА БУДУЩИХ СПЕЦИАЛИСТОВ К ИСПОЛЬЗОВАНИЮ STEM ЛАБОРАТОРИИ В НАЧАЛЬНОМ ОБРАЗОВАНИИ

Аннотация

В статье рассматривается подготовка будущих специалистов к использованию STEM-лаборатории на начальном школе и основана на определении эффективности в соответствии с результатами исследований. Проанализированы научные труды, государственные нормативные документы и программы, раскрывающие содержание темы по вопросу подготовки будущих специалистов к применению STEM-лаборатории в условиях начального образования. Определены возможности процесса подготовки будущих специалистов к использованию лаборатории STEM в условиях начального образования.

В подготовке будущих специалистов начальных классов рассматривается проблема организации исследовательской деятельности учащихся на высоком уровне через развитие их творческого и интеллектуального потенциала. Установлено эффективное использование STEM-лаборатории в начальной школе, эффективность осуществления исследовательской деятельности учащихся в обучении с помощью STEM-технологии.

В целях раскрытия темы исследования, исходя из проанализированных научных трудов, были получены специальные опросы с участием учителей начальных классов с целью определения возможности использования STEM-лаборатории будущими специалистами в условиях начального образования. Кроме того, в статье в результате теоретической дифференциации научных работ методически определены содержание и эффективность использования STEM-лаборатории в образовании, проведен анализ возможностей ее применения. Определены особенности STEM-образования в начальных классах.

Научная новизна заключается в взаимосвязанном теоретико-методологическом рассмотрении возможностей подготовки будущих специалистов к применению STEM-лаборатории в условиях начального образования.

Ключевые слова: STEM, начальное образование, подготовка специалиста начальных классов.

Introduction. Russell Grigg introduces primary teachers to the key principles of good practice for the early childhood years. These principles include the following:

– understanding that children develop rapidly physically, intellectually, emotionally and socially in the early years;

– a focus on ensuring that all children feel cared for, safe and valued;

– reliance on what children already know and can do;

– creating conditions for children to participate in activities shown by adults, as well as for independent knowledge of the world;

– establishing close contact with other specialists and parents;

– the need to prepare a targeted curriculum that motivates and interests primary school children to learn [1] .

Based on the developments of this scientist, we come to the conclusion that when implementing the above principles, it is necessary to professionally master skills of using innovations that future specialists will need when carrying out research and development work, as well as to prepare children from an early age for the purposeful implementation of scientific research activities in new conditions.

At the same time, through the international open online course “Coursera”, which is currently being implemented in universities, students take additional courses and improve their professional skills. This, in turn, helps future specialists to further supplement the knowledge acquired at the university on the topic they have chosen, improve their full-fledged education and become a professional specialist.

While T.S.Sabyrov studied the psychological characteristics of students' cognitive activity, such as positive motivation to study, the ability to independently control the progress of their work, as well as the ability to adapt the acquired knowledge to those that are planned to be obtained in the future [2], the researcher B.Barsay talks about a new model of higher education, where the

following aspects gain great importance in the preparation of future primary school teachers and the formation of their professional and didactic competence:

– preservation and development of human creative abilities;

– transition from structure-centered design to activity-centered design;

– forming a worldview among students based on the multidimensionality of decisions, tolerance for different points of view and moral responsibility for their actions;

– the development of interdisciplinary connections, the systematization of the concepts mastered by students, the formation of a unified view of world development;

– implementation in the learning process of the main goals, such as ensuring the coherence and consistency of the intellectual activity of the contingent of students [3].

Based on the observations made by the authors, we can conclude that future specialists should be trained so that they can reflect on their activities, choose their strategic direction, plan, implement and evaluate what they do, and master metadisciplinary skills. In addition, future primary school specialists should not only acquire new knowledge, but also learn how to commercialize their research activities and practical developments. This is due to the fact that the future specialist will be interested in working in a new direction and will be able to plan his future work only if he sees the results of his work and succeeds.

According to G.K.Nurgaliyeva, the problem of high-quality training of specialists can be decomposed as follows: deep immersion of students in the subject area of the knowledge being taught, teaching them how to “enter” the studied field of knowledge; the development of students' internal needs and progressive interest in the knowledge of the unknown; studying the motivation of students to the creative side of the chosen profession; determination of abilities and skills, incentives that form the independent work of students; identification of factors contributing to the quality of professional training of specialists [4]. Based on the conclusions of the scientist, it is necessary to determine the issues that should guide the preparation of future specialists for elementary school at the university, as well as expand the range of subjects offered in the direction of professionalization and create such conditions for acquiring knowledge in order to ensure the full education of students.

Taking into account the conclusions of scientific works analyzed above and based on our practice, we have chosen to study the problem of preparing future specialists for the use of STEM laboratories in primary education. As part of the study, we opened a modern primary school (STEM laboratory) at the university, equipped it with special tools, and for the first time we are implementing in practice metadisciplinary approaches to organizing simple research activities in primary school.

Basic provisions. In the Republic of Kazakhstan, the training of future specialists of a new formation, who have fully mastered innovative technologies, is the main key task in the field of education. That is why today in society there is a demand for the formation in the spirit of innovation of the competencies of future specialists who can think critically, develop innovation, freely apply their abilities in the implementation of innovative research and methods of commercialization of scientific developments.

In the Law of the Republic of Kazakhstan “On Education”, the main task of the education system is “creation of the necessary conditions for obtaining a quality education aimed at the formation, development and professional development of a person based on national and universal values, achievements of science and practice”, as well as “development of the creative, spiritual and physical capabilities of the individual, the formation of solid foundations of morality and a healthy lifestyle, enrichment of the intellect by creating conditions for the development of individuality” (The Law of the Republic of Kazakhstan "On Education", 2007).

The conclusion from this allows to comprehend that, in accordance with the demands of modern society, future primary school teachers must practice the use of innovative technologies and research, commercialization methods in their professional activities, identify positive changes and

trends in education and training, become versatile professionals who can use their competencies in the educational process.

Material and methods: One of the relevant prerequisites is the introduction of STEM technologies into the educational process and the use of a scientific and methodological base in the form of a large-scale platform that meets the challenges of the modern industrial-digital era of human society, such as innovative and modern trends that exist in education. Although the goals and objectives of the information and educational sphere of all states are philosophically and culturally different, the directions and trends are similar. We can describe them like this:

– democratization of education, i.e. access to education;
– the sequence and presentation of its stages and levels;
– independence and individual approach;
– education for all; getting an education;
– significant influence of socio-economic factors;
– expanding the range of educational and organizational activities;
– aimed at the satisfaction and development of comprehensive interests;
– students' abilities;
– expansion of the market of educational services;
– expansion of the network of higher education;
– valuable financing of education in the developed countries of the world;
– constant updating and correction of education;
– programs;
– increasing interest in talent and ability development;
– search for additional resources for inclusive education.

Figure 1 below shows graphical representation of the purpose of the STEM approach.

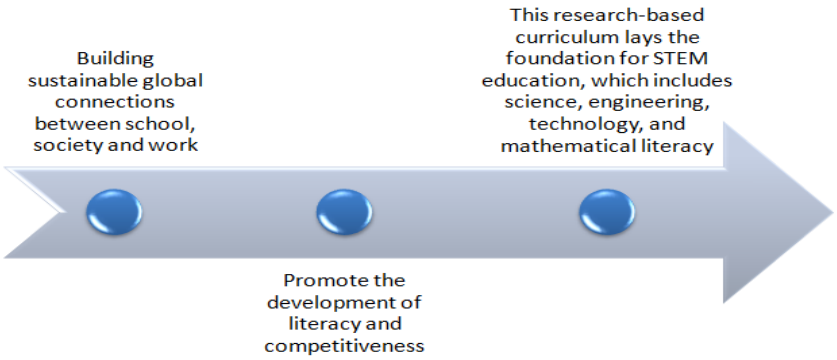

Figure 1. Purpose of the STEM approach

Education is a very conservative area, which must change in accordance with today's reality of life. This is understood all over the world, so STEM education is trending for a reason. Figure 2 presents the image of STEM as a factor influencing divergent thinking.

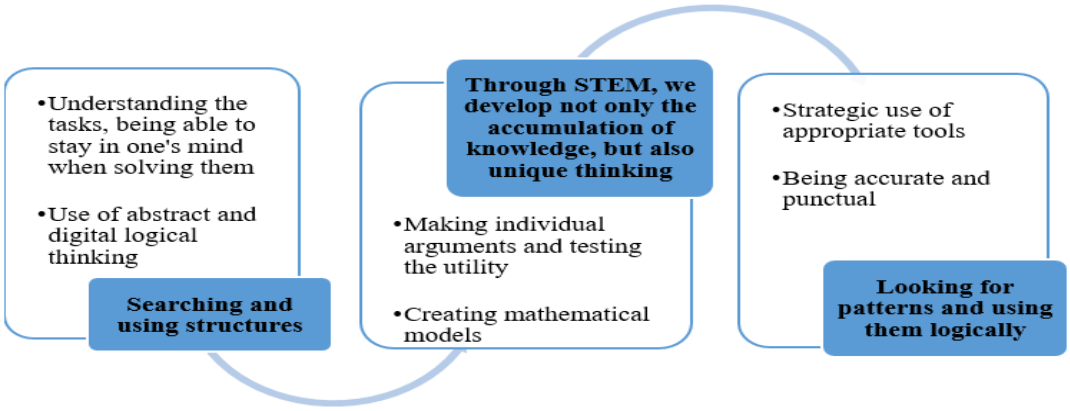

Figure 2. STEM as a factor influencing unique thinking

The benefits of STEM education include the following factors: higher education is becoming an area of intensive funding;

– Grants for the implementation of technological projects for schools;
– STEM may be the broadest skill segment;
– Professional development;
– Technologies for teaching STEM subjects;
– STEM technology means creating a learning environment;
– Allows students to be active;
– Students remember well what they have learned by participating;
– STEM technology requires students to have great abilities;
– Critical thinking, teamwork;
– Ability to work independently;
– Promoting the development of interest in the STEM direction of education.

Table 1 below demonstrates the scope of STEM technology.

1 Table. The scope of STEM technology

№	Technology	Area of application
1	STEM	Future primary school specialists have learned to commercialize their research activities and practical knowledge. In the process of learning and teaching, they practice the use of innovative methods of research and commercialization in their professional activities, form the first scientific understanding in primary school students and train them to conduct systematic research.
2	STEM	This technology makes it possible to apply research activities in any situation of teaching and acquiring knowledge. The educational process is based on the use of metadisciplinary and project approaches, innovations used in the performance of scientific and development work.

In her scientific article “The impact of Covid-19 on the assessment of the use of smartphone applications in STEM education” Irina Ikonnikova examined the impact of the use of smartphone applications in STEM education during the Covid-19 period. First, the loss of access to educational materials and resources in the educational environment puts students at a disadvantage, especially in STEM subjects. On the other hand, although sufficient use of digital technologies may solve the problem, the researchers emphasize that there is a risk of reducing the quality of education. Experience has shown that smartphones are indeed a useful didactic resource that can influence student development, improving learning and interpersonal communication between students and

teachers. With a mobile phone, students can visualize content, give examples, and explore phenomena, search for additional information, perform calculations, quickly share knowledge, and establish a collaborative connection with the teacher in real time – he defined the importance of STEM education [5].

There is a huge potential of STEM technology (Science, Technology, Engineering, Mathematics), which provides a metadisciplinary study of subjects based on the natural sciences considered in elementary school. STEM is based on a metadisciplinary approach: science, technology, engineering, mathematics are not taught separately. STEM teaches to consider problems as a whole and in relation to each other to solve specific technological problems.

We present a metadisciplinary approach to analyze the key components of STEM education across four specific disciplines. STEM is an integrator of four components. S – science, T – technology, E – engineering, M – mathematics. Scientific understanding of STEM – develops the mental activity, cognitive and creative potential of the student by obtaining scientific information related to the problem under consideration. (STEM) technology (technology) is the human process of creating useful products and services. The product of the invention is the result of purposeful human activity. This component is a natural substance that a person acts on in the labor process, or an information substance processed by a person in the process of intellectual labor. In our opinion, technology is a continuous activity of students aimed at the transformation of matter, energy, information and creation, the study of these processes to meet human needs. The next component of STEM educational technology is electronic engineering. The engineering component shows its abilities in computer or model (poster) modeling and creation of the main accented object or subject for each topic of teaching natural science in primary grades. The word “engineer” in Latin means “to make”, which is “to create”, “to invent”, “to implement”. The M-mathematics component of STEM education is the most important and complements the integrated knowledge in all components [6].

Among the prospects for the development of STEM education, there are three main areas: personalization of education, emphasis on project thinking and teamwork. According to Figure 3, there is a plan for introducing STEM elements into educational programs.

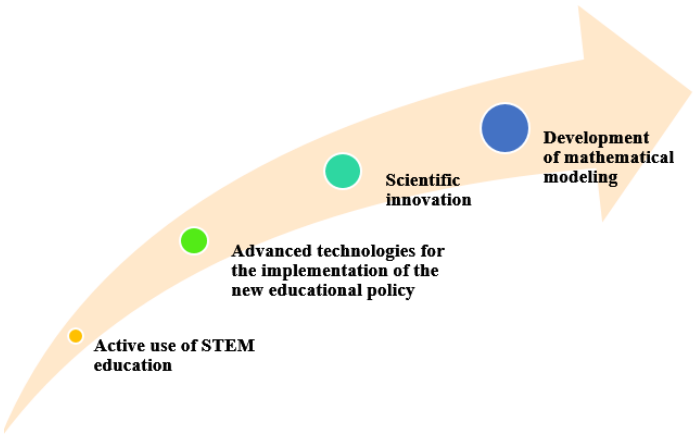

Figure 3. Plan for introducing STEM elements into educational programs

According to G.S.Tulentaeva, Z.T.Seylova and K.M.Berkimbayev, STEAM education (science, technology, engineering, art and mathematics) is aimed at developing students the competencies necessary for success in the modern world. The authors also note that this work is in full swing in the content and programs of education in the primary education system, in the writing and implementation of textbooks [7].

STEM should become part of educational programs not only in universities, but also in schools. This will help create a unified system for preparing a person for life, improve the efficiency of education, and the competitiveness of domestic science and industry on the world stage.

From this point of view, the issue of using the STEM laboratory in the training of primary school specialists in higher education institutions is one of the most important issues requiring scientific research. The reason is that, although the current primary school textbooks provide learning tasks aimed at shaping students' research activities, it is widely known that primary school teachers do not get used to their level due to insufficient preparation for students' research activities and the lack of special equipment. Table 2 below summarizes the content of curriculum for one of elementary school subjects (The educational program on the subjects of "natural science" in primary grades within the framework of updating the content of secondary education of the Republic of Kazakhstan, 2016) [8].

2 Table. The content of the "Natural Science" subject curriculum in elementary school

Curriculum for "Natural Science" subject	
	It is aimed at forming the basis for teaching the subjects "Biology", "Geography", "Chemistry", "Physics" in secondary school, developing the ability to use the acquired knowledge to explain, describe and predict natural phenomena and processes encountered in everyday life (at home, in school, in nature).
The purpose of the curriculum for "Natural Science" subject in elementary school	
	Development of the basis of knowledge about the image of the world from the point of view of modern natural science and the development of research skills and abilities of students.
Tasks of the discipline	
	– Development of the basis for research activities, thinking, communication skills and abilities. – Acquaintance with important ideas and achievements of natural science, which have made a significant contribution to the development of engineering and technology. – Mastering the skills of applying the acquired knowledge to explain the phenomena of the surrounding world and obtaining important and vital information from the point of view of natural science and various sources of information. – Development of intellectual, creative abilities, the ability to think critically in the process of simple research, analysis of phenomena, obtaining and interpreting natural and scientific information. – Understanding the laws of nature and raising confidence in the possibility of using natural science achievements for the development of civilization and improving the quality of life. – Development of skills in the application of natural science knowledge to ensure life safety in everyday life, the competent use of modern technologies, health and environmental protection.

STEM skills are essential for students to understand what they are learning and help them solve real problems and situations. In the following Table 3, we consider the work of scientists who have studied the STEM problem from different angles.

3 Table – Characteristics of STEM

№	Scientists	Characteristics of STEM
1	Alabdulhadi, A. &Faisal, M. (2021)	The STEM approach is based on the integration of several disciplines combined into a new and unified form [9].
2	Widva W., Rifandi, R. & Rahmi, Y. L. (2019)	Building STEM requires a strategic approach and concept to mastering STEM skills. The goal of STEM-based education is to improve four skills in future professionals in science fields. In particular: scientific skills, technology skills, problem solving methods and mathematical skills [10].
4	PermanasariA. (2016)	STEM education is a learning of innovation for building XXI century skills [11].
7	Lou, Chou, Shih, &Chung, (2017)	Student creativity can be enhanced through STEM [12].
9	Thibaut, Ceuppens, et al. (2018)	STEM education allows students to significantly improve their presentation skills [13].
10	Sigit, D. V., Ristanto, R. H., &Mufida, S. N. (2022)	STEM learning model improves students' environmental skills [14].

Primary school students should be taught not only by school textbooks, but also by specialists working on real projects. Classes in specially organized laboratories help to learn the material and develop practical skills. In this regard, the place of STEM educational areas is special. STEM education is based on the use of metadisciplinary approaches in four professional subjects.

Primary school teachers have not fully mastered the methodology of using a modern STEM laboratory in the development of students' research activities when teaching natural sciences, mathematics and knowledge of the world in primary school. This situation creates problems affecting the quality of the education system.

Results and discussion. Teachers of the educational program "pedagogy and methods of primary education" of the Arkalyk Pedagogical Institute named after ibrai Altynsarin opened a specially equipped "modern primary school" on the topic "scientific and methodological foundations of preparing future primary school teachers for the operation of a STEM laboratory".

Within the framework of the project, a special curriculum was developed on the topic “STEM laboratory in primary education” and provided with methodological complexes on the subject in order to theoretically and methodically master the organization of student research work in a modern STEM laboratory, which will be implemented in accordance with the needs of modern society and elementary school. The following Figure 4 visualizes the characteristics of STEM education in elementary schools.

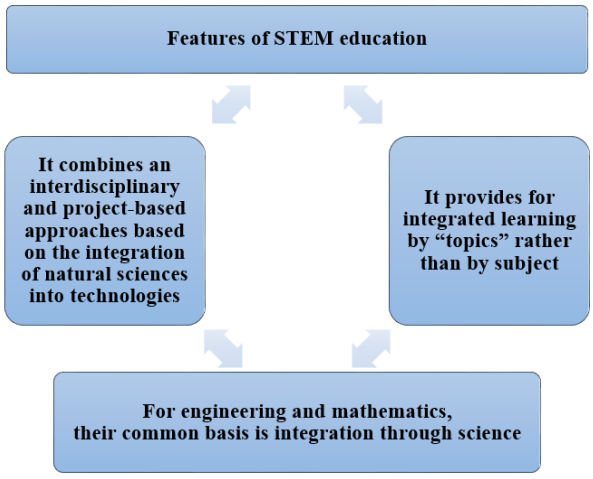

Figure 4. Features of STEM education in elementary school

In STEM education, an integrated subject line in elementary grades helps us organize its components. At this stage, skills are developed with scientific and technical knowledge in common life, teaching critical thinking through STEM components, the ability to solve problems independently, show leadership in group and pair work, and strengthen motivation for technical subjects and research skills, etc. e. We will promote the core activities in the field of education. However, it is clear that almost all of this will show its effectiveness if implemented in science lessons in primary grades.

The main categories of STEM education are integration, interdisciplinary communication, scientific knowledge, mathematics, natural sciences. The STEM approach opens up the opportunity for elementary school students to systematically explore the world, understand the logic of surrounding phenomena, determine and understand their relationships, learn new, unusual and very interesting things.

In elementary school students, the expectation of learning something new develops interest and cognitive activity; the need to identify an interesting task for him, choose ways to solve it and create an algorithm, the ability to critically evaluate the results – develops an engineering style of thinking; collective action improves teamwork skills. This approach shows the highest level of self-improvement of the student, and also gives great opportunities in choosing a profession.

A new approach to STEM education today:

– STEAM (Science, technology, engineering, art and mathematics);

– STREM (Science, technology, robotics, engineering and mathematics).

In elementary grades, the benefits of STEM technology are based on practical areas. In particular, these are: to increase students' aspirations and interest in STEM in the classroom; increase the potential of students and the quality of STEM education in the course of their daily activities; Pedagogical, psychological and methodological support for STEM education opportunities in primary grades; Building a powerful database using STEM educational technologies in science classes.

The introduction of STEM education in elementary schools is of great importance:

– increases interest in mathematics and natural sciences;

– helps to gain knowledge in the field of mechanical engineering, robotics, assembly;

– contributes to the early identification of the student's potential and self-determination of their professional self.

– develops creativity and interaction skills.

One of the main prerequisites for STEM education is learning in small groups. For example, research projects offered in specially equipped STEM labs for elementary school students are conducted in a group form. This, in turn, promotes student teamwork, mutual respect and cooperation, and the development of participation skills. When using STEM technology, we should observe the following principles:

– use of metadisciplinary approaches;

– developing an understanding of simple scientific research;

– educational materials and specially equipped laboratories, developed taking into account the age characteristics of students;

– access to the implementation of proposed projects and studies;

– compliance with the rules of corruption;

– student-parent-teacher communication.

As part of the topic of our study, we have analyzed the works of a number of scientists. Foreign scientists (Breiner et al.,2012) [15] consider STEM as a large-scale system, and domestic scientists believe that it is a tool for the development of creativity (Ramankulov et al., 2022) [16], association Sciences (Kazbekova, 2022) [17].

Based on the analyzed scientific papers, in order to reveal the research topic, in order to determine the possibility of using the STEM laboratory in primary education by future specialists,

we organized a survey with the participation of primary school teachers in the city of Arkalyk, Kostanay region. The survey involved 216 primary school teachers as respondents.

The questionnaire "Using the STEM Lab in Primary School" included the following questions:

1. What do you know about STEM?
2. What is the level of organization of work aimed at developing the research activities of students in elementary school?
3. Does participation in and interest in STEM contribute to the development of students' academic skills?
4. What is the possibility of using the STEM Lab in elementary school?
5. Have you tried organizing labs in elementary school textbooks using STEM technology?
6. What are your thoughts on using the STEM Lab in elementary school?

The results of the survey "Use of the STEM Lab in Primary School" showed the following. 34.7% of primary school teachers who answered the first question of the survey answered that it was a technology, 40.3% answered that it was a research method, and 25% did not answer the question. Graphically, Figure 5 presents the answers to the first question of the survey.

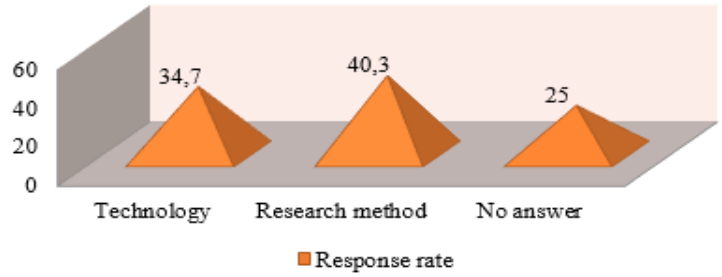

Figure 5. Chart of results for the first question

The second question was: "What is the level of organization of work aimed at the development of research activities of students in primary school?". 80.1% of the answers to this question indicated that, in some cases, they organize possible training and internships, 19.9% – they organize the participation of individual talented students in special projects.

10.6% of the answers to the third question "Does participation and interest in STEM improve student learning skills?" said that it promotes the development of learning skills, 70.1% said that most teachers have not tried it in practice, and 19.3% did not answer. Figure 6 shows a graphic representation of the answers to the third question of the survey.

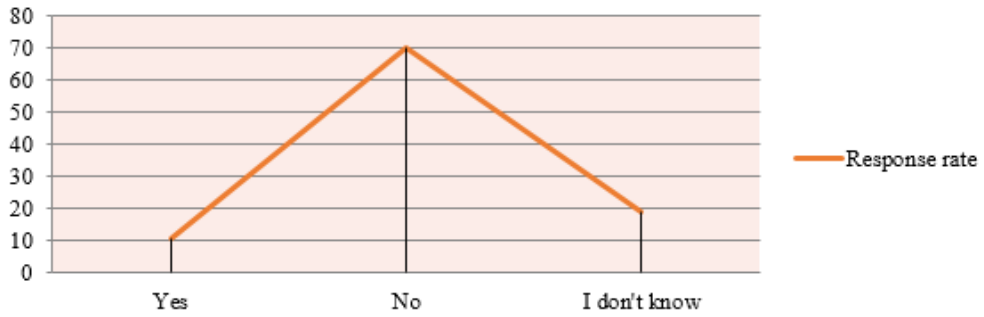

Figure 6. Statistics of answers to the third question of the questionnaire

Answers to the question "What are the opportunities for using the STEM Lab in elementary school?" show the following picture: 45.8% believe that this approach has great potential for use in schools for gifted students, 33.8% say that it should be used as often as possible in schools, 14.4%

say that special tools for there are no laboratory workers. In addition, 6% of respondents did not answer this question. The following Figure 7 shows the response data on the fourth question of the survey.

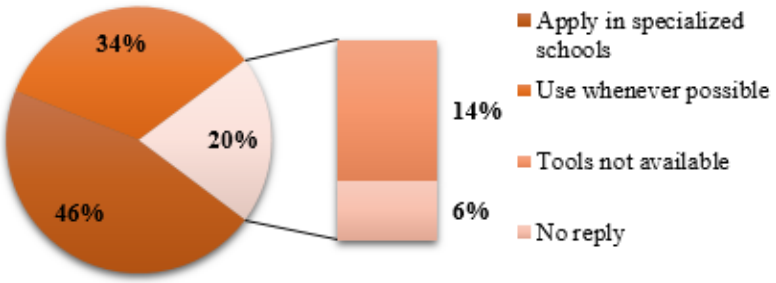

Figure 7. Statistics of answers to the fourth question of the questionnaire

To the question “Have you tried organizing laboratory work in elementary school textbooks using STEM technology?” the answers of the respondents were as follows: 9.7% – yes; 90.3% – no. Therefore, we can conclude that most primary school teachers do not have a complete understanding of STEM technology.

On the question “What do you think about the use of the STEM Lab in elementary school?” primary school teachers expressed the following opinion:

– if a special subject is introduced into the training of future primary school teachers in higher educational institutions, focused on mastering the methodology for using the STEM laboratory;

– if special training seminars and various events are organized to teach how to use the STEM laboratory in elementary school;

– if special methodological tools and e-learning materials on STEM technology have been created.

The first and fourth questions of the questionnaire concern teachers' knowledge of STEM technology; the second and fifth questions prompted teachers to identify opportunities for implementing STEM technologies in education and training. We concluded that the majority of those who answered the third question are not motivated to transform the educational material of the textbook in a new situation. However, teachers’ opinions about the use of the STEM lab in elementary school express a positive attitude.

The survey conducted above revealed that elementary school teachers have low knowledge about STEM technology, they have heard about the concept from information sources and have insufficient information about its possibilities in education and upbringing. Although teachers have little information about the STEM lab used in elementary school, we have determined that students systematically plan research activities from elementary school, support continuous integration into education and training, and are interested in learning about STEM technology by participating in specially organized professional development courses.

Conclusion. In conclusion, we note that society itself proves the modern need for STEM educational technologies. This happens because today the implementation of a number of activities is most important, such as participation in scientific research, expanding the knowledge fund by including interesting information in it, replenishing mathematical knowledge, and developing engineering skills through digital knowledge.

The basis of STEM education is a system-active approach for application in independent research work of students. STEM is a universal, experience-oriented approach that allows elementary school students to solve problems of any complexity. We especially note that in the lessons of natural sciences, students can apply their knowledge in practice. Solving any industrial or domestic problem, they have the opportunity to draw knowledge from many areas. Moreover, in

order for the student to be fully prepared for life and further professional development, in a modern school it is useful and necessary to collect a fund of scientific knowledge available for everyday application.

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БОЛАШАҚ АРНАЙЫ ПЕДАГОГТЕРДІҢ ИНКЛЮЗИВТІ ЖАҒДАЙДА ЖҰМЫС ІСТЕУГЕ ДАЙЫНДЫҒЫН БАҒАЛАУ

Аңдатпа

Мақалада авторлар заман талаптарына сәйкес арнайы педагогтарды дайындау мәселелерін қарастыра отыра, әдіснамалық тұрғыда шетел және отандық ғалымдарыдың ой-пікірлері мен еңбектеріне талдау жүргізді. Авторлар «Арнайы педагогика» білім беру бағдарламасы бойынша оқитын студенттердің инклюзивті ұйымдардағы болашақ кәсіби қызметке деген сенімдері мен қатынасына байланысты зерттеу жүргізді. Олардың жалпы білім беретін ұйымдардағы арнайы педагог (дефектолог) жұмысының ерекшелігі туралы білім деңгейдерін зерттей отыра, ЖОО-да оқу кезінде болашақ арнайы педагогтерді инклюзивті білім беру жағдайында психологиялық-педагогикалық сүйемелдеуді жүзеге асыруға бағдарланған даярлаудағы ықтимал кемшіліктер мен мәселелерді анықтайды. Студенттердің инклюзивті бағытталған кәсіби құзыреттіліктерін, оның ішінде психологиялық-педагогикалық сүйемелдеуді жүзеге асыруға қатысты жүргізілген сауалнама нәтижесін талдау негізінде мақала авторлары университетте болашақ арнайы педагогтерді неғұрлым тиімді даярлауды қамтамасыз ету бойынша тәжірибелік ұсыныстар көрсетеді.

Түйін сөздер: арнайы педагог, инклюзивті білім беру, инклюзивті жағдайлар, кәсіби дайындық, кәсіби құзыреттілік, шектеулі мүмкіндіктер.

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ОЦЕНКА ГОТОВНОСТИ БУДУЩИХ СПЕЦИАЛЬНЫХ ПЕДАГОГОВ К РАБОТЕ В ИНКЛЮЗИВНЫХ УСЛОВИЯХ

Аннотация

В статье авторы рассмотрели вопросы подготовки специальных педагогов в соответствии с требованиями времени, а также с точки зрения методологии провели анализ мнений и трудов зарубежных и отечественных ученых. Авторы провели исследование, связанное с убеждениями и отношением студентов, обучающихся по