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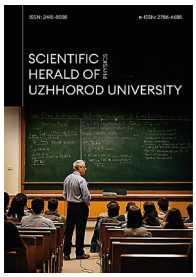

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Methods and ways of preparing educational research activities for future elementary school teachers based on renewed education

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Abstract

Relevance. The article addresses the importance of research on modern education in the professional preparation of future elementary school teachers. The research relevance is determined by the fact that modern teachers have difficulties in stimulating attention and approaches to learning of elementary school children. In this regard, students in higher educational institutions of the Republic of Kazakhstan are in continuous search of new methods, techniques, and forms of organizing educational research activities based on updated education.

Purpose. The research aims to study the methods and forms of research activity training for future elementary school teachers based on renewed education in Kazakhstan.

Methodology. The methodological basis of the research consisted of general theoretical methods of scientific knowledge: analysis and synthesis, abstraction and idealization, and modeling.

Results. The research results concluded that all modern elementary school teachers participate in pedagogical experiments in the modern education system, in all innovative processes, develop new educational programs and implement new educational technologies that require research skills based on renewed education. The issues discussed relate to the importance of curricula and experiments as well as the approach that students (future elementary school teachers) use in research activities.

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Conclusions. All of the studies reviewed included issues of professional development for future teachers over a long period, throughout their higher education. It should be noted that the entire education of elementary school teachers, as found in the study, includes the impact of a broader context, while all studies consider the impact of the same educational standard. All the activities described in the research contributed to the development of approaches to teaching science that were consistent with the current research literature. The practical significance of the research lies in the results that can be used as an instructional and practical material for students and researchers involved in school education and early childhood education.

Keywords: updated content of education; learning research activities; motivation; competence; elementary school teacher.

Introduction

The existence and importance of pedagogical research in the training of future schoolteachers are issues that appeal not only to scholars and researchers around the world but also to teachers and students. The core of research activity is the professional transformation of students through participation in scientific activity and the acquisition of new knowledge, which is one of the main missions of higher education [1].

Pedagogical research is becoming increasingly important in the education of future teachers. This increased interest has led to a study of student and teacher attitudes toward educational research, as well as student attitudes toward the problems associated with that research. Despite the growing interest in the topic, more research is needed on future elementary teachers' attitudes toward the research training they receive in a renewed education setting since such information is poorly represented in teacher education curricula. They also point to the importance of early literacy in the research of elementary school teachers and that research activities related to classroom practice are more important to students [2].

Students' participation in research and other related activities depends not only on personal factors such as motivation and initiative but also on structural factors such as curriculum development and the strategic activities of university departments. Therefore, L. Cardozo-Gaibisso et al. [3] argue that curriculum development should eventually educate students and empower them to learn.

As the authors argue, these two issues help to relate teaching methods to the epistemological action that characterizes the construction of knowledge. Similarly, they suggest learning practices where students and teachers can engage in research activities to democratize knowledge creation at the societal level. Some research shows that prospective teachers are changing their teacher preparation programs to include more questions for teachers, preferably from an early age [4]. Many prospective teachers agree that completing one or two subjects at the end of their training does not provide the pedagogical research knowledge needed for important activities in their future teaching practice. Another important aspect of the curriculum is the people responsible for designing and delivering it [3].

Aspects to consider when integrating research into the curriculum are also indirectly related to the competencies of teachers and curriculum developers. If research is to be incorporated into the curriculum, those who develop it must be willing to do so. Creating a high-quality instructional program requires developers to have expertise in design, domain, and teaching. In addition, it shows that incorporating research into the teacher education curriculum requires changes in early education. Students' attitudes toward the original course have been tested in this context [5].

The research on the topic is one of the relevant issues due to the increased interest in STEM education among elementary school children by the scientific community and the lack of development of issues related to the preparation of research activities for future elementary school teachers in the Republic of Kazakhstan. The study is based on the works of modern educators, sociologists, and political scientists, who in their works consider the implementation of updated education in the curriculum.

The researcher L. Boström [6] in his work considers and defines the role of research activity in the preparation of future specialists in professional pedagogical activity in general. In his opinion, the formation of students' creative abilities, their preparation for various forms of activity, development of an adequate attitude toward the surrounding world, refer to the fundamental tasks of modern education. Scientific works of K. L. Franck and J. L. Donaldson [7] consider the improvement of the system to stimulate the scientific activity of students by establishing special incentives in the form of grants or taking prize funds. The works of C. Mosito [8] and K. Smolkowski et al. [9] consider the formation of a positive attitude to research activities and the development of scientific research from the first years of study. They argue that this is important because research will play an important role in their future careers. Future teachers should be convinced that participation in scientific and pedagogical seminars has a positive impact on their work.

Based on this, the research aims to investigate the methods and forms of preparation of educational research activities for future elementary school teachers based on updated education.

Materials and Methods

The research sources base on methods and forms of preparing educational research activities of future elementary school teachers based on updated education were modern pedagogical research on the development of modern technologies, the formation of students' thinking, and the impact of such technologies on their professional development. To completely master the topic, methods of logical cognition, such as the method of analysis and synthesis, abstraction and idealization, and modeling were used as the methodological basis of the research. The method of analysis is applied as a way of thinking, which refers to the analysis of the studied subject into its components, which were considered in the sections of the research work. The collection of reliable materials for the

research of methods and preparation forms of educational research activities of future teachers of primary classes based on the renewed education in the Republic of Kazakhstan was carried out, the research problem was set, the importance and purpose of the research were discussed, the general plan of the research was created. The analysis addresses the main terms such as "STEM knowledge", "research activity", "experiment", "elementary school teacher", "professional qualities", "motivation" and many others, as well as the main points of view on the pedagogical conditions for starting research activity.

Synthesis as a method of scientific cognition demonstrated the process of combining the various components of the stages of research activities into a whole, a system, without which it is impossible to acquire scientific knowledge on the phenomenon of forms of preparation of educational research activities of future elementary school teachers based on renewed education. Synthesis provided an opportunity to represent the whole as a unity of knowledge from the analysis. With the help of synthesis, there was a generalization of analytically selected and tested properties of methods and forms. The theses obtained as a result of synthesis are included in the theory of the whole study, which, enriching and clarifying, determines the methods of subsequent scientific research. The method of synthesis allowed us to combine separately considered earlier components of the study of pedagogical conditions of STEM-knowledge formation in the system of primary general education and made it possible to understand the components, to identify connections connecting pre-selected parts when performing the analysis in one line.

The method of abstraction used in the research allowed us to highlight the individual characteristics of each analyzed concept in terms of the updated formation and its additional characteristics, properties, or relations of separate property, diverting attention from other properties. The modeling technique was also used, in which the object of interest to the researcher is replaced by another object that is relatively similar to the first object. Another cognitive method applied in the research of research activity formation of future elementary school teachers based on renewed education was the method of observation, the gist of which lies in the fact that it is expressed as an initial method of empirical cognition. It is a special research method, which is based on human sensory abilities such as sensitivity, perception, and representation, during which a person experiences the external influence from the object in the process of training. Generalization of the research results allows us to evaluate the reliability of all used cognitive methods. Methods of scientific objectivization, systematization, theoretical generalization, and classification of all research results were implemented.

Results

In modern conditions, one of the main sources of sustainable development of education is the teacher, who can be the subject of professional activity. The teacher is always mastering new practical and transformative competence based on research skills. In today's realities, teacher solves such complex tasks as choosing a pedagogical paradigm and forming their sphere of values and individual system of professional activity. Teachers and principals of educational institutions are engaged in experimental and research work, processes of creating qualitatively new models of pedagogical practice, and scientific reflection [9].

They all become participants in various and large-scale experiments conducted in the system of modern education, participate in innovative processes, choose educational and methodological circles, methods, and technologies of education, and write or develop new educational programs for students. Active, practical technologies, forms, and methods of learning are implemented in a modern elementary school with the active use of creative and younger students' research activities. Students are already engaged in research activities in elementary school, and sometimes starting from preschool. The widespread use of the educational model in the research process, and the intensification of research activities of students requires a teacher to acquire new professional skills that would help in the proper organization of this activity. Under such conditions, all the research abilities of the teacher significantly change, in the new conditions become one of the important factors in the transformation of pedagogical practice, the acquired experience of the teacher, and his professional and personal development. The development of pedagogical research plays the role of a link between pedagogical science and pedagogical practice in which transformation occurs based on the reflection of changes in pedagogical activity experienced by the teacher and the development of research competencies [10].

By integrating learning, it is possible to succeed in most in-demand professions. Technology step by step increases the motivation to learn and expands basic knowledge in professions such as design or programming, for example. Today, STEM educational technology is becoming popular all over the world. The word is an abbreviation of the term, where S is science, T is technology, E is electronic engineering, and M is mathematics. STEM knowledge is a set of educational and professional disciplines in the field of natural, technological, engineering, and mathematical sciences, aimed at training specialists in a new type of thinking, without which the development of an innovative economy is impossible. The emergence of STEM knowledge is associated primarily with the problem of fragmentation of the disciplines taught at school and the inability of students to apply knowledge from different disciplines in a single project. The use of STEM technology in education will allow children to develop highly organized thinking and learn to apply their knowledge effectively in later life. The main goal of STEM education is to develop creative thinking, skills to use the engineering approach to solve real-world problems, and awareness of the role of technology in solving them. The STEM approach includes a very wide range of activities, approaches, practices, and methods aimed at preparing children of all ages for the future [9].

The transition of higher education to the new STEM standards requires significant changes in the understanding of higher education along with the development of the educational research model that allows students to think independently and creatively. In this direction, the role of various currents and forms of student research work is increasing. Student research work ranges from a desirable

but optional element of the educational process to the gathering of necessary and important resources for academic development. While studying at the university, students themselves contribute to the development of theoretical and applied problems in various fields of scientific knowledge, including pedagogy, and identify ways to apply them in practice. Research activity in combination with other forms of the educational process contributes to the creation of a competent educational base for modern graduates. The analysis of the existing practice shows that the system of research training is based on the following principles [8]: purposeful treatment of administration, in particular, control of research readiness; creation of a scientific-didactic environment in the university to provide motivation, interaction and joint activity of students and teachers.

The teacher-researcher is a professional who can create new qualitative material and spiritual values in the educational process. The teacher can combine traditional conservative teaching, which gives the process sustainability, stability, controllability, and immutability, and introduce students to innovative teaching, which generates new facets, variability, and creativity. A scientifically active teacher is characterized by a deep understanding of the modern educational process, clearly aware of all the requirements that the current society imposes on the quality of the educational institution, the theoretical basis of his activity is a deep knowledge of the achievements of pedagogy and psychology, analysis of best practices of the teacher. Research activity requires any teacher to know the details and subtleties of working with students, but in addition to this and the stages of the research process [9].

The knowledge of the details of the research process allows the teacher to manage activities more precisely and to have a professional sense of their innovativeness, forming a new pedagogical reality and developing their vision. A modern teacher should be able to predict and program his or her activities, innovate, engage in research activities, implement a creative idea, see the problem and its essence, research the problem, generate ideas, and have the ability to self-design. The value of research activity lies in the fact that each teacher is in a special moral state, emotionally flexible, and carries out the activities under a reflexive plan. The teacher-researcher realizes the process of creative self-actualization, focuses his activity on the student, on the educational process as a whole, and models and corrects the actions of the student [5].

A scientific-educational environment of the educational institution provides unification of common goals and coordination of activities in the main areas, such as research work of the department, student research work, organization of practice in the department and outside the educational institution, the educational process, management of the subject and scientific work of students, as well as the experience of individual teachers. The following components of scientific activity are distinguished in the system of teacher training students: purpose, motivation, content, activity, control, and evaluation, which provide: the formation of students' motivation for research activity, development of their subjectivity, creating an atmosphere of productive activity; content of practical lessons, implementation of interdisciplinary communication, involvement of students in the performance of exercises [11].

The assessment and control apparatus contains the criteria and indicators of students' readiness for research activities and combines cognitive, personal, and activity components. Knowledge characterizes the degree of development of conceptual apparatus, the ability to use the created theoretical basis in the research process. Personal factors include motives and attitudes, valuing the personality, as well as students' reflection in the research process. Activity determines the level of mastery of research skills and the ability to apply them in practice [12].

The implementation of a holistic student participation system in the university research activity, which includes pedagogical activities, becomes the intellectual work of students, which helps to solve many problems: the development of independent work and creative abilities of students; intensification of the educational process; use the results of research in the educational process [11].

The goal is to allow students to work independently on a particular topic in a specific framework setting, using scientific methods for theoretical and experimental research. For future elementary school teachers to be professionally oriented, they must be informed about relevant aspects of pedagogy. With the help of problem-oriented laboratory teaching, the development of student's independent work, including activation activities, can be achieved. Considering the development of students' research skills as a system, we assume that their composition corresponds to the composition of the didactic system, which we call a comprehensive system. The research process in this aspect is nothing other than its subsystem, with the difference that its content and tools are already "presented" as constituent parts, i.e., operate according to a certain scheme [8].

Students research activity and their didactic training can be viewed as a process of solving a wide range of problems, the complexity of which is perceived as a learning and research task. The problem presents itself as an object of research activity and as a pedagogical organization of this activity. The purpose, conditions, and requirements of students' research activity are directly or indirectly determined by the research task. So, in the process of scientific research there is a synthesis of logic and intuition, consisting in mastering a set of special skills, including the ability to see the problem and explain the real essence; the ability to express problems with certain cognitive tasks; ability to build hypotheses and imaginary predictions of actions; ability to use logic and narrative, combining known methods and create new ones, find an alternative to the obvious solution [13; 14].

Any research involves professional development over a long period, from one year to five years of teaching. Research with teachers demonstrates significantly better student results, indicating that when teachers are mutually supportive and included in the research work, the result is more effective [15].

A distinctive feature of research activity is that much of the content of the research work is related to a specific curriculum of a particular institution of higher education. All research focuses on vocational education and training with an emphasis on science programs, where teachers

receive the necessary support in the form of instructional materials such as schedules, worksheets, and detailed lesson plans [10; 16].

To help teachers better understand academic content and the research process, professional development classes should be redesigned to link module content, instructional strategies, and assessment. Although the learning areas are theoretically and practically oriented, they have all involved the development of theoretical knowledge outside of direct practice. Basic Approaches to Teaching Science is one of the most practical courses. Within the curriculum, future teachers receive tremendous support in the form of teaching materials, detailed lesson plans, and even worksheets. However, teachers who desire to use the program should continue to study to deepen their understanding of the theoretical foundations of the program, noting the study of general teaching philosophy, rather than relying solely on hands-on instruction. In other cases, more emphasis has been placed on theory. For example, blended learning provides teachers with pedagogical strategies to improve the status, participation, and achievement, of their low-achieving students [12].

Summarizing the above-mentioned, it can be concluded that in none of the main subjects of pedagogy teacher's scientific knowledge did not develop independently of the research activity. Students demonstrate the ability to plan experimental work, accurately determine construction levels, plan an experiment, and know how to use analytical methods in research activities. Their work usually includes the necessary research protocols, and observations, most often students use tables, charts, and various systems. The design and organization of students' work are improving, indicating a qualitative development of their ability to work with texts, essays, and literature. Students desire to present the results of their research work at student research conferences is increasing, which is reflected in the number of topics to participate in the final student conference. To acquire new skills that will change the competent practice of research activities and restructure the value and meaning field of future teachers, it is necessary to involve the student in continuous research.

Discussion

Analysis of scientific sources revealed that scientific works, which are devoted to the training of educational research activity of future elementary school teachers based on updated education are well developed. There are no such works in the scientific environment of the Republic of Kazakhstan. But it is worth noting that there are many works of the authors, which can be used as a reference in the development of methods and forms of preparation of educational research activity for future elementary school teachers based on the renewed education in the Republic of Kazakhstan.

One such research was a work by R. M. Gillies [16], which addresses the problems of renewed education in the context of globalization. The topic involves issues of underdevelopment. Following the author, most students agree that educational research is important to the teaching profession. However, the research training that future teachers receive as part of the educational process is poor and disjointed, according to the students surveyed. One of their main criticisms is that curricula offer a research-related course in the first year and then a teaching and research course only in the final year. This intermittent teaching makes students feel that they are unlikely to do educational research when they become practicing teachers. These are very specific topics that do not have enough consistency to be able to gain the relevant long-term knowledge needed to conduct research after graduation [16].

Pedagogical research concluded by B. Tolgfors [17], addresses the essence of renewed education in secondary school teacher education. The study address the main issues of higher education reform. The focus is on a new kind of higher education. Presents research evidence on the impact of digital technology on today's youth; which means that higher education must adapt to the demands and challenges of today; presents the possibilities of using digital technology in school education. The main trends, problems, and threats to the already existing school practices of using information resources and technologies abroad are identified. The identified threats can be countered only by a proper and flexible combination of traditional and modern approaches to the organization of the educational process with competent scientific and methodological support of this process, the development of health-saving and psychological and pedagogical diagnostics, as well as in the context of higher education institution management and scientific and pedagogical diagnostics [10; 17]. The author of the article agrees that today modern technologies are most used in the educational process, which has a main place in the life of every person. Digital technologies provide ample opportunities for the formation of competence of the future elementary school teacher.

The works of A. Fauzi and H. Rifai [11] and S. Fraser et al. [18] consider society's awareness of the need for an active approach to the educational process. The urgent problem of improving the quality of education has become one of the conceptual problems of educational development in the modern world, focusing on the content side of education, unity, and the scope of knowledge, skills, and competencies. Therefore, standardization of educational content has become the most dynamic direction of education reform and the main direction of development of educational systems, their reconstruction, and adaptation to the modern world. Tendencies of education development based on integration processes, i.e., formation of information society and development of economic knowledge, interrelation of education and labor market, further promotion of education as a global priority is possible until its realization as a factor of social and economic changes as a means of self-realization. Considering the important educational potential of culture, its ideological role, and its unity and complementarity with upbringing and education, the importance of the influence of external factors, not directly dependent on educational institutions, on students is emphasized. Information is in all aspects of human life and has an enormous impact. The adequacy and effectiveness of the proposed solution to the content of education largely depend on the content of the information flow. Here the unity of requirements and tasks of the state, society, family, and personality is important [11; 18]. The work can be a supplement to further research

on the preparation of future elementary school teachers in the Republic of Kazakhstan.

The articles by D. Vallett et al. [19], S. Wang et al. [20], B. Yıldırım and C. Türk [21] address issues of teacher preparation for distributing and implementing STEM knowledge in educational systems. The role of STEM technologies in the process of shaping the professional skills necessary for a modern secondary school is demonstrated in the research. Key trends in higher education that have been updated with the STEM approach are highlighted. The modern school is viewed as a space focused on preparing the future personality, ready to perceive an integrative system of knowledge and its application in a dynamically changing socio-educational reality [22-25]. Providing schools with qualified personnel is the main task of the educational systems of all technologically developed countries. STEM education is based, in particular, on the Soviet experience of engineering training [26]. Technologically developed countries of the world have developed educational new strategies to ensure the development of STEM education at all levels, starting from kindergarten. STEM technologies are a link between education and professional development [27]. The innovative educational concept prepares students at the professional level for life in a technologically developed world. The perspective of STEM education development can be divided into several directions: choice of subjects, emphasis on project teamwork, and a hybrid form of learning [28-30]. Subject selection includes the opportunity to study only a few subjects in elementary school, the rest can be freely chosen. With this system of education, students can quickly decide on a professional direction and focus on core pedagogical disciplines. The emphasis on design and teamwork in business shows that professionals with a design vision who can work and lead a team will be needed in the future. STEM education can meet the needs of employers for today's professionals because STEM education promotes the development of "agile" skills and is based on the intersection of key contemporary disciplines [31-34]. The possibility of a hybrid learning format has allowed many to master certain external platforms. The pandemic has demonstrated how important and practical the Internet is. This experience allows learning and workflow to take place in a mixed format: offline plus online [35]. This approach allows students the freedom to plan their study time and become independent of dorm availability. This format allows colleges and universities to include highly qualified faculty who cannot teach face-to-face [19; 21].

The issue is closely related to the research topic as the modern technology development process requires highly qualified teachers combined with modern methods of teaching. Such specialists are needed as a specialist related to economic development, security, and competitiveness is always valued. STEM education in the future should be completely integrated into educational programs of universities, schools, and pre-schools [36]. This will allow us to build a unique system of training, education, and upbringing, and improve the efficiency of preschool, primary, general, secondary, and higher education systems [37; 38].

To summarize the research, it is worth noting that following the authors, student participation in research activities seems to be a useful and cost-effective strategy for increasing the professional competence of students and teachers. Research activities help students interpret the research of others and become more aware of their learning. Engaging students in research activities is one way to develop their ability to understand and participate in a variety of learning environments. Inquiry-based learning is designed to help students develop confidence and independent learning, understand their knowledge and its sources, better understand how research works, and develop thinking skills such as analytical and problem-solving skills.

Conclusions

Modernization of teacher education based on the modular principle of learning allows training elementary school teachers, to design teaching and research activities by incorporating scientific activities of their choice into the modules. A comprehensive analysis of scientific sources leads to the conclusion that the education of future elementary school teachers described in the study generally considered the influence of the broader educational context, and all the studies reviewed mentioned the influence of the same educational standards.

All of the activities described in the research supported approaches to science teaching that were consistent with the current scientific literature and policies of the Republic of Kazakhstan, suggesting that it may be difficult to make changes that are not supported by research or are not consistent with domestic policy trends. All the sources reviewed showed some level of collegiality among their participants. This included the involvement of outside experts in providing educational content, some form of inquiry into the current situation, and facilitation of change.

The research that led to significant changes in practice was over at least one year and often provided ongoing support throughout the study period. It is worth noting that, certain practices can be changed in a single professional development, and significant changes seem to take much longer. In all of the large studies, participants provided explicit educational goals related to science.

An important aspect of this research group was the extent to which the professional development of prospective elementary school teachers promoted the implementation of specific curricula rather than the development of teachers' ability to plan programs, sections, lectures, and activities independently. Activities included the ability to read, observe, and receive feedback from specific approaches used in real or simulated learning situations, and to participate in learning activities marketed as students. In all the large studies, teachers participated in a kind of learning community where participants shared their ideas, experiences, and concerns to help each other implement individualized practices, but the specific activities teachers used to accomplish this varied widely.

The set problems in the research are relevant for further studies, which should be continued in the analysis of the research on the updated education in the professional training of future elementary school teachers. Further study of the topic can be based on the development of comprehensive research, which will focus on the development of new educational methods based on the

pedagogical capabilities of students. This will further develop the analytical thinking of future elementary school teachers, increase interest in their professional creativity, learn to formalize the results of their work through work, and build a professional and scientific career.

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Conflict of Interest
None.

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Методи та шляхи підготовки до навчально-дослідницької діяльності майбутніх учителів початкової школи на засадах оновленої освіти

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Анотація

Актуальність. У статті розглядається важливість дослідження сучасної освіти у професійній підготовці майбутніх учителів початкових класів. Актуальність дослідження визначається тим, що сучасні вчителі відчувають труднощі в стимулюванні уваги і підходах до навчання дітей молодшого шкільного віку. У зв'язку з цим студенти вищих навчальних закладів Республіки Казахстан перебувають у постійному пошуку нових методів, прийомів і форм організації навчально-дослідницької діяльності на основі оновленої освіти.

Мета. Метою дослідження є вивчення методів і форм навчання дослідницької діяльності майбутніх учителів початкової школи на засадах оновленої освіти в Казахстані.

Методологія. Методологічну основу дослідження склали загальнотеоретичні методи наукового пізнання: аналіз і синтез, абстрагування та ідеалізація, моделювання.

Результати. За результатами дослідження зроблено висновок, що всі сучасні вчителі початкової школи беруть участь у педагогічних експериментах у сучасній системі освіти, у всіх інноваційних процесах, розробляють нові освітні програми та впроваджують нові освітні технології, які потребують дослідницьких навичок на засадах оновленої освіти. Обговорювані питання стосуються важливості навчальних програм та експериментів, а також підходу, який студенти (майбутні вчителі початкової школи) використовують у дослідницькій діяльності.

Висновки. Усі розглянуті дослідження включали питання професійного розвитку майбутніх учителів протягом тривалого періоду, впродовж усього навчання у вищій школі. Слід зазначити, що вся освіта вчителів початкової школи, як було виявлено в дослідженні, включає в себе вплив ширшого контексту, тоді як всі дослідження розглядають вплив одного освітнього стандарту. Усі види діяльності, описані в дослідженні, сприяли розробці підходів до викладання природничих дисциплін, які відповідають сучасній науковій літературі. Практичне значення дослідження полягає в тому, що його результати можуть бути використані як навчальний і практичний матеріал для студентів і науковців, які працюють у сфері шкільної освіти та дошкільної освіти.

Ключові слова: оновлений зміст освіти; навчально-дослідницька діяльність; мотивація; компетентність; вчитель початкової школи.