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*Postgraduate training of primary school teachers through  
the forming of the pupils' scientific picture of the world*

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**КУЗЬМЕНКО Василь** – доктор педагогічних наук, професор, завідувач кафедри педагогіки та менеджменту освіти, КВНЗ «Херсонська академія неперервної освіти», вул. Покришева, 41, Херсон, 73000, Україна

**KUZMENKO Vasyi** – Doctor of Pedagogical Sciences, Professor, Head of Pedagogy and Management of Education Department, Kherson Academy of Continuing Education, Pokrysheva Str., 41, Kherson, 73000, Ukraine

E-mail address: [kuzmenkovasiliy@gmail.com](mailto:kuzmenkovasiliy@gmail.com)

ORCID: <http://orcid.org/0000-0002-0211-5173>

ResearcherID: <http://www.researcherid.com/rid/C-9659-2019>

**ПРИМАКОВА Віталія** – доктор педагогічних наук, професор кафедри теорії й методики виховання, психології та інклюзивної освіти, КВНЗ «Херсонська академія неперервної освіти», вул. Покришева, 41, Херсон, 73000, Україна

**PRYMAKOVA Vitaliia** – Doctor of Pedagogical Sciences, Professor of Education, Psychology and Inclusive Education Department, Kherson Academy of Continuing Education, Pokrysheva Str., 41, Kherson, 73000, Ukraine

E-mail address: [pran703@gmail.com](mailto:pran703@gmail.com)

ORCID: <http://orcid.org/0000-0002-8914-6748>

ResearcherID: <http://www.researcherid.com/rid/C-9339-2019>

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## ПІСЛЯДИПЛОМНА ПІДГОТОВКА ВЧИТЕЛІВ ПОЧАТКОВОЇ ШКОЛИ ДО ФОРМУВАННЯ В УЧНІВ НАУКОВОЇ КАРТИНИ СВІТУ

*У статті обґрунтовано актуальність проблеми післядипломної підготовки вчителів до формування наукової картини світу в молодших школярів. Аналіз публікацій, присвячених дослідженням з цієї та подібних тем дав змогу констатувати, що в сучасній літературі бракує вагомих напрацювань з окресленого питання. Для вирішення проблеми нами було проаналізовано її теоретичні аспекти, виявлено методи, конкретизовано педагогічні умови, реалізація яких зможе забезпечити готовність вчителів початкової школи до формування в учнів наукової картини світу.*

*З цією метою було уточнено сутність понять «наукова картина світу молодшого школяра», схарактеризовано особливості її формування учнів початкової школи. Для реалізації цих особливостей учитель початкових класів має створити сприятливе середовище для індивідуального розвитку школярів в початковій школі, організувати різні види інтегрованої навчально-пізнавальної діяльності, зокрема творчої, дослідницької, самостійної, трудової тощо; реалізовувати принцип природо відповідності щодо урахування вікових особливостей розвитку молодших школярів; уміти добирати ефективні форми і методи оптимізації освітнього процесу; забезпечувати розвиток пізнавальних психічних процесів (сприймання, пам'ять, уява, увага, мовлення, мислення), для розвитку яких молодший шкільний вік є сенситивним періодом.*

*Проаналізувавши можливості системи післядипломної педагогічної освіти у розв'язанні окреслених завдань, визначено етапи відповідної підготовки фахівців, до яких віднесено курсовий, міжкурсний періоди та самоосвіту педагогів, системна робота впродовж яких має забезпечити готовність до виконання такої діяльності. Структурними компонентами готовності визначено мотиваційний, когнітивний, діяльнісний, рефлексивно-коригувальний, їх зміст схарактеризовано в публікації.*

*На основі розроблених критеріїв і рівнів сформованості готовності педагогів до розв'язання зазначеного освітнього завдання (високий, середній, низький), здійснено її педагогічну діагностику, після чого експериментально перевірено дієвість її ефективність обґрунтованих нами педагогічних умов. Тож, педагогічні умови постдипломної підготовки вчителів до формування наукової картини світу в молодших школярів, а саме: мотивування вчителів початкових класів щодо цього напряму педагогічної діяльності; опанування теоретичними знаннями про сутність ключових понять та особливості формування в молодших школярів наукової картини світу; формування у вчителів необхідних для цього фахових умінь і навичок; удосконалення рефлексивних умінь та відпрацювання навичок коригувати подальшу роботу з урахуванням отриманих результатів, було визнано дієвими й ефективними.*

**Ключові слова:** наукова картина світу; світоглядні уявлення; молодші школярі; підготовка вчителів; післядипломна освіта; самоосвіта; цілісність знань.

## POSTGRADUATE TRAINING OF PRIMARY SCHOOL TEACHERS THROUGH THE FORMING OF THE PUPILS' SCIENTIFIC PICTURE OF THE WORLD

*The article substantiates the problem of teachers' postgraduate training through the forming of junior pupils' scientific picture of the world. The analysis of publications devoted to this research and similar topics made it possible to state that in contemporary literature there are a lack of significant works on the above-mentioned question. To solve the problem, we analyzed its theoretical aspects, identified methods, specified pedagogical conditions, implementation of which can ensure the readiness of primary school teachers to form pupils' scientific picture of the world.*

*The article clarifies the essence of «the junior pupils' scientific view of the world» concept and characterizes the features of its formation. To realize these features, the teacher of elementary school should create a favorable environment for individual development of schoolchildren in primary school, organize various types of integrated educational and cognitive activities, in particular creative, research, labor, etc.; to implement the principle of the nature compliance in order to take into account the age peculiarities of junior pupils; be able to find effective forms and methods of optimizing the educational process; to provide the development of cognitive mental processes for the development of which the junior school age is a sensitive period (perception, memory, imagination, attention, speech, thinking).*

*After analyzing the possibilities of the postgraduate pedagogical education system in solving the above-mentioned tasks, we defined the stages of appropriate specialists training, which include the coursework, between the course periods and the self-education of teachers, the systematic work during which the readiness to perform such activity is determined. The structural components of readiness are motivational, cognitive, activity, reflexive and corrective; their content is described in the publication.*

*On the basis of developed criteria and levels of teachers' readiness formation to solve this educational task (high, medium, low), its pedagogical diagnostics was carried out, after which the efficiency and effectiveness of the pedagogical conditions substantiated by authors were experimentally tested. Thus, we determined the pedagogical conditions of postgraduate teacher training to the forming of junior pupils' scientific picture of the world, namely: the motivation of primary schools teachers in this direction of pedagogical activity; mastering theoretical knowledge about the essence of key concepts and forming of junior pupils' scientific picture of the world peculiarities; formation of the necessary skills for the teachers; improvement of reflexive skills and working skills to adjust further work taking into account the results obtained, were recognized effective.*

**Key words:** scientific picture of the world; world outlook; junior pupils; teacher training; postgraduate education; self-education; integrity of knowledge.

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## **Introduction**

In the context of reformation of the Ukrainian educational system, the problems of forming teachers as professionals, raising the level of their competence, pedagogical skills that need to be improved throughout life are being actualized. Modern educational changes, determined primarily by European integration processes, the updating of the regulatory framework, transformations in the construction of a modern lesson in elementary school, contributed to the implementation of the pedagogical principles and approaches defined in the Concept of the New Ukrainian School. The desire to optimize the educational process in the institution of general secondary education, the implementation of classical and updated pedagogical approaches, the solution of the actual educational tasks should contribute to the younger generation's development of their life-generation. To do this, each individual must have formed scientific picture of the world, information culture, high spiritual and moral and strong emotional and volitional personal qualities.

## **Analysis of recent research and publications**

S. Goncharenko studied the scientific picture of the world as a system of integral representations about the surrounding world (Honcharenko, 1994). V. Kuzmenko pointed out that it is formed on the basis of the the person's generalized knowledge assimilation about the surrounding world, their integration into the existing experience (Kuzmenko, 2007). In the conditions of dynamic and at the same time unstable life, the idea of the world of pupils will be more coherent and more adequate if they master the methods of integrated learning-cognitive and practical-oriented activities. It argues, analyzing the conditions and methods of forming the integrity and systematic knowledge of students about living nature, N. Bibik (2015).

K. Hus studied in details the pupils' formation of the natural sciences of the world, L. Sheletstov – the humanitarian, where the first scientists defined the totality of representations about the world created as a result of mastering natural and mathematical sciences (Huz, 2004), and the second – humanitarian disciplines (Shelestova, 2007).

I. Grishanov, reflecting on science as a sign of the world picture, provided the knowledge that pupils from different reliable sources, features of objectivity and relative truth, had to receive their integrity and adequacy (Grishanov, 2003). The formation of holistic knowledge, according to A. Stepanyuk's statement, provides such signs as completeness, systemicity and generalization. The scientist delimits the completeness with subtleness and emphasizes the fundamentalization of knowledge for the expansion of the world picture (Stepaniuk, 1999).

At the same time, the analysis of the future teachers' training contents, the careful study of textbooks and manuals that are used now in high school, have shown that themes on the scientific picture of the world and its pupils' formation are covered in them is limited and fragmentary. This confirms that the problem of the preparation of primary school teachers for such a direction of professional activity as the scientific picture of the world formation in the field of education is still unresolved.

Postgraduate pedagogical education, as noted by A. Zubko, has powerful opportunities for its launch, in particular through the organization of teaching teachers in the course and between the course period. The scientist also emphasized on the importance of self-education in the formation of vital and professional competence, self-perfection of the individual (Zubko, 2006). Given the flexibility of functioning mechanisms and the ability to respond quickly to the educational needs of teachers, this system is capable of providing training for specialists to formulate a pupils' scientific picture of the world. It must create conditions for the development of the creative person qualities and encourage the specialists to search and apply the necessary theoretical knowledge and practical skills.

In this way, we can state that the problem of forming the pupils' scientific picture of the world is sufficiently covered in the scientific literature regarding the secondary and senior levels of school education, and not enough – in the work of the elementary school. In the system of teachers' postgraduate education there is a lack of research on the training of teachers for the formation of junior pupils' scientific picture of the world.

**Purpose.** The purpose of the paper is to analyze the pedagogical conditions for the preparation of primary school teachers in postgraduate education, in order to form students in the scientific picture of the world and experimentally verify their effectiveness.

To achieve this, we analyzed the theoretical aspects of the problem, identified methods, and clarified the approaches to organizing the appropriate training of primary school teachers in postgraduate education; on the basis of developed criteria and levels of teachers' formation readiness to solve this educational problem, its pedagogical diagnostics was carried out, the validity of the pedagogical conditions was experimentally tested.

### **Junior pupils' scientific picture of the world**

The scientific picture of the human world is expanding continuously throughout life with varying intensity. Age peculiarities of the development of junior school-children determine the differences in the development of worldview, worldview, so it is obvious that their perceptions of the world will be different from the picture of the world of another age. At the same time, purposeful activity in school education accelerates the processes of knowledge of the world and the formation of representations based on them, which integrate into the existing experience of the child (Stokhof et al., 2017).

S. Goncharenko, defining the scientific picture of the world as the highest form of systematization and generalization of scientific knowledge about the world and objective reality, specified that it is formed as a result of the human sensory synthesis, empirical and intellectual experience (Honcharenko, 1994). This statement gave us the right to interpret the junior pupil's scientific picture of the world as an open system of representations about the surrounding world, formed as a result of his knowledge on the basis of integrated knowledge available to pupils by age (Prymakova, 2012). The openness of the system is explained by the constant development of science and the widening of the range of scientific knowledge about the world, reflected in the content of educational subjects, and by the continuous individual development of the junior pupil's cognitive mental processes, which enable us to make creative use of the acquired life experience, deepening the existing picture of the world during the educational process. Objectivity of knowledge provides a scientific approach to the content of educational material and the choice of effective forms and methods for studying various subjects in the educational process of elementary school. The intensity of processes depends to a large extent on the professional competence and pedagogical skill of a teacher who knowingly performs such work (O'Brien et al., 2013). This increases the urgency of the problem of training teachers in the system of continuing education to activities related to ideological issues.

The indicated statement requires constant attention, because qualitative training is a complex, integrative, open phenomenon. The teacher has to manage the complex processes of child's knowledge about the surrounding world, creating the optimal conditions for transforming his domestic picture of the world into a scientific one, as well as teaching the child to know it by his own, to explore and understand the phenomena and processes occurring in it, to understand and explain the nature of life, quickly and flexibly adapt to the transformations in it (Leander & Osborne, 2008).

### **Research methods**

To accomplish the tasks of scientific research, we selected and applied a set of theoretical and empirical methods, including methods of mathematical statistics.

The theoretical analysis and synthesis of scientific sources which provided a profound analysis of psychological and pedagogical, philosophical and methodological literature on the above-mentioned question were assigned to the group of theoretical ones, the analysis of domestic and foreign experience was used to substantiate the initial provisions of the study and clarify the content of key scientific concepts; classification, systematization, generalization of information and method of modeling, gave an opportunity to substantiate the structure of the corresponding preparation and pedagogical conditions of its realization, as regards the performance of specialists' specific activity.

From the group of empirical methods we have been selected: a questionnaire of primary school teachers, testing, interviews, surveys, observations, pedagogical experiment, where the confirmatory stage enabled to reveal the present state of the problem, and the formative one – to find out the degree of effectiveness of the im-

plemented work to ensure the readiness of teachers to form junior pupils of the scientific picture of the world.

Methods of mathematical statistics were used to process the results of each stage of the pedagogical experiment, which made it possible to establish the reliability of the research results and formulate the conclusions of the work.

### **The course and results of the research**

The results of the study on determining the readiness of primary school teachers to form the junior pupils' scientific picture of the world have shown that the vast majority of teachers are not sufficiently aware of the theoretical and practical issues of the formation of a scientific picture of the world, which is linked first of all with a lack of attention to these issues during the preparation for the pedagogical activities of institutions of higher education and postgraduate students, as well as pedagogical colleges.

The vast majority of surveyed teachers who participated in the qualitative experiment do not understand enough the relevant terminology (picture of the world, ideological ideas, worldview), do not always aware of the importance of pupils' scientific picture of the world forming, which complicates the conscious choice of effective forms and methods necessary for its formation of junior pupils.

Therefore, one of the objectives of the study was theoretical substantiation, the development of pedagogical conditions for the preparation of primary school teachers for the formation of pupils' scientific picture of the world and an experimental verification of their implementation effectiveness in postgraduate education. For its successful solution, the general scientific task was specified by a number of tasks, among which the formation of an important experiment was acquired.

After examining the specifics of pedagogical activity regarding the formation of junior pupils' scientific picture of the world, the possibilities of the postgraduate education system in relation to the appropriate training of primary school teachers, we have identified the pedagogical conditions that should facilitate the formation of appropriate teacher readiness. For the same purpose, the content of the concept of «the formation of pupils' scientific picture of the world» was determined and the content is defined as an open, dynamic, continuous process of educational activity organization, which involves the implementation of didactic, psychological and moral aspects, taking into account the experience of the junior pupil.

In order to implement these aspects, it is important for the elementary school teacher to: create an enabling environment for individual development of school-children during the educational process in elementary school, the organization of integrated educational and cognitive activities, in particular, creative, research, design, labor, etc.; taking into account the age peculiarities of the junior pupils development; selection of effective forms and methods for optimizing the educational process; the development of cognitive mental processes, for which junior school age is a sensitive period (perception, memory, imagination, attention, speech, thinking).

As the results of the qualifying phase it was revealed a low readiness level of the bigger part of primary school teachers to form the pupils' scientific picture of

the world. So they had to state the limited knowledge of the teachers on theoretical issues of the problem and the lack of organizational and practical readiness, that is, the availability of professional skills to optimize the educational process in elementary school. Since the mentioned negative influences on the formation of junior pupils' integral knowledge, the emergence of objective ideological ideas, which are necessary for socialization in a changing world was the basis for using the resources of postgraduate education as much as possible. Therefore, comprehensive work on the implementation of the above-mentioned pedagogical conditions was organized in the course, inter-curricular periods and during the self-education activity of the teacher.

The conditions for such training were: the motivation of primary school teachers in this area of pedagogical activity; mastering theoretical knowledge about the essence of the concept «scientific picture of the world» and the peculiarities of its junior pupils' formation; formation of the necessary skills for the teachers; improving reflexive skills and working out skills to adjust further work taking into account the results which are obtained.

Structural components of the readiness of the elementary school teacher to the formation of pupils' scientific picture of the world were recognized as: motivational, cognitive, organizational and activity, reflexive and corrective. Their formation as a result of systematic work showed the level of teachers' readiness to form the junior pupils' scientific picture of the world.

The criteria for assessing the teachers readiness were the following changes in the following indicators: awareness of the need to form the junior pupils' scientific picture of the world; knowledge of «scientific picture of the world» concept and the peculiarities of its pupils' formation; the formation of the skills necessary to carry out such work; the formation of self-examination and self-assessment of the teacher's work skills with the goal of further adjusting it.

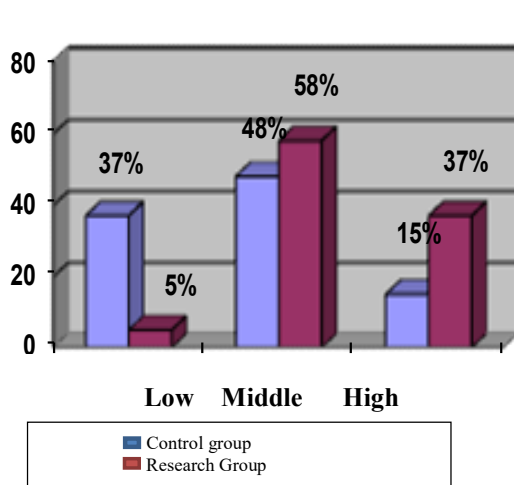
The formative experiment was conducted with division of teachers into control group (CG) and research group (RG). Participants of the control group were listened to a lecture on the topic «The junior pupils' scientific picture of the world formation» and offered a task for independent study. For the experimental one a special course was conducted on the theme «Methodology of forming the pupils' scientific picture of the world», the materials of the manual and methodical recommendations for the program of the special course were worked out. The program also included visits to pedagogical practice in school, the writing of graduation papers, abstracts and articles on relevant topics. For this group the work continued distantly in the intercourse period, it also provided for the implementation of independent tasks and issues for discussion at meetings of school methodological associations, creative and problem groups.

The results of the forming stage showed a positive dynamics of the readiness formation in the research group participants in comparison with the control group and substantially exceeded the results of the qualifying phase. As a result of the experiment, after the planned work, the number of participants in the control group

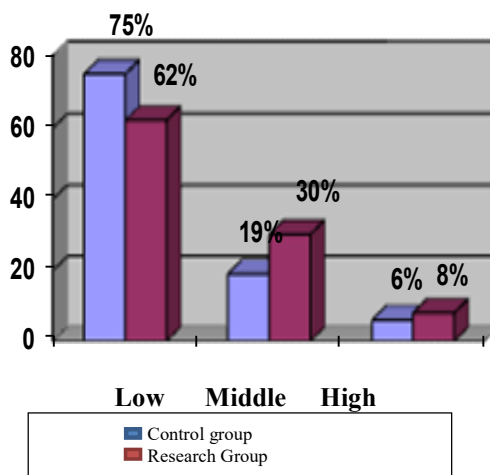


with a high level of readiness to perform the specified type of activity increased by 9 %, the average – by 29 %, and the low – decreased by 38 %.

The best results were obtained after organizing and conducting work in the course, intercurricular periods and during self-education activities with the participants of the research group: the number of primary schools teachers with low level of readiness to perform the specified task, decreased by 57 %, those who had an average level, increased significantly by 27 %, and the number of teachers who had a high level of readiness before the experiment increased significantly by 29 %.



**Fig. 1. The results of the teachers' readiness to the formation of pupils' scientific picture of the world in the beginning of the research**



**Fig. 2. The results of the teachers' readiness to the formation of pupils' scientific picture of the world after the ending of the research**

Indicators showed by the level of teachers' readiness to perform the specified type of activity in the control and research groups at the beginning of the research were approximately the same. After the research, the indicators changed so that in both groups the average level of readiness for the formation of junior pupils' scientific picture of the world has significantly increased (KG – by 29 %, RG – by 27 %), and in addition to the participants in the research group, there has been a significant increasing of the teacher' number with a high level of the primary school teachers' readiness (by 29 %). Thus, an increase in the quality of teacher training for the formation of junior pupils' scientific picture of the world is 28 %, which indicates positive changes in the training of specialists during an research verification of the outlined pedagogical conditions effectiveness.

The obtained results made it possible to conclude: the realization of pedagogical conditions significantly influenced the motivational sphere of teachers, causing a steady interest in work in the direction of forming a pupils' scientific picture of the world. The level of primary school teachers awareness of on theoretical issues of the problem has increased; the level of the formation of the relevant professional

skills, self-examination skills and teacher's self-assessment for further adjustments to professional activity.

**Conclusion.** Preparation of primary school teachers for the formation of the pupils' scientific picture of the world was considered as an open dynamic process, the result of which is the professional, general cultural, moral and personal readiness of the teacher to perform the specified activity. We define appropriate readiness as a complex, holistic, dynamic phenomenon consisting of interrelated and interrelated components (motivational, cognitive, activity, reflexive-corrective), which satisfy the requirements for the professional activity by forming the junior pupils' scientific picture of the world.

The analysis of the research results proved the effectiveness, efficiency, performance of the introduction of pedagogical conditions. The results of the experiment indicate the expansion of the theoretical knowledge and professional skills of primary school teachers in relation to the problem and the corresponding type of activity, awareness of the need for its implementation, the emergence of a stable interest in further study of the problem, the desire for further professional and personal growth.

**Prospects for further research.** The problem involves the need for constant updating of knowledge, improvement of teachers' professional skills, enrichment of their intellectual, general cultural, moral, personal, creative levels. Further research requires the preparation of future primary school teachers to form the pupils' scientific picture of the world; finding ways to optimize the educational process in elementary school, as this is the main condition for the formation of integral knowledge and the creation of adequate ideological ideas based on them.

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