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TRENDS OF IMPLEMENTATION OF RESEARCH-EXPERIMENTAL ACTIVITIES IN PRESCHOOL EDUCATIONAL INSTITUTIONS OF UKRAINE IN TODAY'S CONDITIONS

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Abstract. *The article characterizes the current state of implementation of children's experimentation in preschool pedagogy of Ukraine. The results of a survey of pedagogues of preschool educational institutions regarding the peculiarities of the organization and implementation of the functions of research-experimental activities of preschoolers have been given.*

The authors carried out definitive analysis of the concepts of the research «children's experimentation», «research-experimental activity». The content and features of the organization of research-experimental activities of preschool children have been clarified, taking into account the psychological-pedagogical publications of modern foreign and Ukrainian scientists and the available creative pedagogical experience. Examples of researches and experiments for preschool children have been offered.

Materials and methods. Theoretical (analysis and synthesis of scientific sources, generalization and systematization) and empirical methods (survey) have been used in the process of research. The authors conducted a questionnaire in order to find out the state of the organization of children's experimentation in preschool educational institutions.

Results. As a result of the research, it is established that almost the third of the respondents are afraid to change the traditional system of preschool education, namely the transfer of «ready-made» knowledge to children, which becomes the main obstacle to the introduction of experimentation into educational practice.

Conclusions. Based on the analysis of pedagogues' surveys, the study of theoretical and practical experience, trends of implementation of children's experimentation in preschool educational institutions in today's conditions have been determined.

Keywords: *research-experimental activity, children's experimentation, educational process of preschool educational institution, preschool children, educators.*

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Introduction

During the last decade, world educational systems have been changing and improving in accordance with the demands and needs of modern society, science, culture and economy. In this regard, the problem of forming from an early age of such abilities and skills, competences of a person as the ability to learn, observe the surrounding world and find the ways to safely use its resources for the development of civilization, becomes extremely urgent.

The key competences that children acquire in preschool education institution become the basis for further learning in school and higher education institution (Pirozhenko et al., 2021; Kruty et al., 2021). These competencies are formed during various types of activities, but the only type of activity that provides an effective influence on the formation of all competencies is experimentation.

Children's experimentation is an activity specially organized by the pedagogue or children, in which children who obtain preschool education, through independent discovery, problem solving, practical transformative actions using various research methods, master one of the key competencies, namely research, which continues in primary school and throughout life (Karuk, 2020).

The organization of experimentation stimulates the desire for cognition and assimilation of new knowledge, promotes the development of creative and intellectual abilities. It also helps children learn how to independently find ways out of difficult situations, answer problematic questions, and promotes their artistic-aesthetic, physical, and communicative development.

In the process of experimentation, the child gradually masters the model of research activity – from the initial formulation of the problem to the subsequent proposal of the hypothesis and its verification by research and experimentation. At the preschool age, the child has access to the techniques of the simplest planning of an experiment, comparative analysis of observed processes, obtained results, etc.

The main objective of the publication is to present the results of the study of the peculiarities of the implementation of children's experimentation in preschool education institutions of Ukraine in today's conditions.

The theoretical background

In the context of our research, studies that determine the specifics of pedagogues' work in the process of organizing research-experimental activities with preschoolers are important. Thus, in the studies of I. Skalstad, E. Munkebye, the development of interest of children aged 4–8 years during experimental activities in various natural environments in the open air is analyzed, and the role of pedagogues in supporting this interest is also considered. It is found out that children's interest evolves through three phases, each of which is characterized

by a specific attitude to the specific natural element, and teachers can actively influence this process by demonstrating their knowledge and establishing social and cognitive relationships (Skalstad & Munkebye, 2022). In addition, many researchers note the importance of pedagogues acquiring professional competences, in particular, the ability to properly organize communication with children in the process of research activities as a key factor for children's education (Gitomer & Zisk, 2015; Spektor-Levy, Baruch, & Mevarech, 2013; Thulin & Redfors, 2017).

Researches by M. Fridberg, A. Jonsson, A. Redfors, S. Thulin discovered that an effective pedagogue should be able to take into account the point of view of children and the object of learning at the same time, finding the ways to support interaction between them. Additionally, successful learning requires balanced use of scientific concepts (Fridberg, Jonsson, Redfors A., & Thulin 2019). Analysis of scientific researches proves that preschool children show more interest in research activities when they feel uncertain about their knowledge, when the information they observe is contradictory (Bass et al., 2022; Bonawitz et al., 2012; Cook et al., 2011; Köksal et al., 2021; Sobel et al., 2022; van Schijndel et al., 2015).

Research by E. Lapidow, C. M. Walker focuses on the study of trends in the implementation of research-experimental activities with children from four to six years of age. Their work examines the issue of children's choice of informative actions and generalization of accurate conclusions based on the results of their own observations in the process of studying cause-and-effect relationships. The results indicate that children have a pronounced tendency to choose actions aimed at revealing the true cause-and-effect structure, to draw conclusions, to formulate conclusions that correspond to the revealed results. The research also takes into account the possibility that the success of children's independent choice may be related not only to the tendency to achieve the desired effect, but also to the development of scientific thinking and self-learning at the early age (Lapidow, & Walker, 2020).

Ö. Köksal, B. Sodian, H. Legare studied the extent to which 5-6-year-old children can consciously evaluate the effectiveness of evidence in a situation where causal relationships are ambiguous. The results of the research showed that preschoolers asked for additional information more often when faced with ambiguous evidence, which indicates their ability to consciously understand the informational content of the evidence (Köksal, Sodian, & Legare, 2021).

The works of M. Sobel, D. Benton, Z. Finiasz, Y. Taylor, D. S. Weisberg explore a new aspect of children's learning through exploratory games. The authors conclude that the degree to which children can learn from their own exploration during playing may depend on how the game unfolds (Sobel, Benton, Finiasz, Taylor, & Weisberg, 2022).

Methodology, organization and results of the research

In the research, we used theoretical (analysis of scientific sources on the research problem, generalization, systematization and organization of theoretical provisions of the researched problem) and empirical research methods (survey). In order to find out the state of the organization of children's experimentation in a preschool education institution, a survey was conducted in April 2023, in which 42 pedagogues of preschool education institutions of the city of Vinnytsia participated (preschool education institution No. 10, preschool education institution No. 23). The survey was conducted in e-environment (Google form). The content of the survey provided for the identification of educators' awareness of experimentation as a type of children's activity, its organization and use in the educational process.

The analysis of the results of the survey showed that 34 respondents of pedagogues of preschool education institutions have the most comprehensive definition of the concept of «children's experimentation» (an activity specially organized by the pedagogue or children, in which children who obtain preschool education through independent discovery, solving problem tasks, practical transformative actions using various research methods master one of the key competencies, namely research, which continues in primary school and throughout life). At the same time, other interviewed educators, namely 6 respondents and 2 respondents, chose incomplete definitions (2 and 4), which indicates a superficial understanding of the organization of experimentation *(Table 1)*.

Table 1 ***Results of the survey «What is children's experimentation? »*** *(made by authors)*

Activity specially organized by the pedagogue or children, in which children who obtain preschool education through independent discovery, solving problem tasks master one of the key competencies, namely research.	34 respondents
Activity of the pedagogue in the curse of which children obtain new knowledge, abilities, skills, necessary for their development.	6 respondents
Activity of a child in modeling other type of activity with entertaining or educational purpose.	2 respondents

The teachers' answers to the question «How often do you use research-experimental activities with children? » were relevant for our research. This made it possible to claim that the majority of preschool teachers often organize children's experimentation, which is already one of the leading activities of preschoolers. 24 respondents of preschool education institutions answered that they organize experimentation 1-2 times a week, 12 respondents – constantly, 4

respondents – 5-6 times a week. The share of educators who do not use research-experimental activities is 2 respondents *(Table 2).*

Table 2 ***Results of the survey «How often do you use research-experimental activities with children? »*** *(made by authors)*

constantly	12 respondents
5-6 times a week	4 respondents
1-2 times a week	24 respondents
don't organize at all	2 respondents

The results of the survey showed that children's experimentation is most often organized during the following educational areas according to the Basic Component of Preschool Education (2021): «Child in natural environment» – 37 respondents, «Child's game» – 19 respondents, «Child in the world of art» – 18 respondents, «Child in sensory-cognitive space» – 15 respondents. The least experimentation is organized by educators in the following educational areas: «Child in society» – 11 respondents, «Child's personality» – 10 respondents, «Child's speech» – 3 respondents *(Table 3).* The majority of respondents answered that children's experimentation is organized during the educational direction «Child in the natural environment», because it is through such activities that direct interaction with the environment and familiarization with objects of living and non-living nature, as well as with natural phenomena, takes place. Therefore, research and experimental activity of preschoolers in nature is the basis of empirical knowledge of the environment, a source of knowledge and the development of cognitive interests.

Table 3 ***Results of the survey «When studying which educational areas according to the Basic Component of Preschool Education (2021) do you organize children's experimentation? »*** *(made by authors)*

Educational area «Child's speech»	3 people
Educational area «Child's personality»	10 people
Educational area «Child in society»	11 people
Educational area «Child in sensory-cognitive space»	15 people
Educational area «Child in the world of art»	18 people
Educational area «Child's game»	19 people
Educational area «Child in natural environment»	37 people

Important for our research were the opinions of pedagogues of preschool education institutions regarding the value of organizing children's experimentation in a preschool education institution. The answers were quite diverse, but what was common among them was that they all are aimed at the child's independent knowledge of the environment, as well as at the development of a personality. For example, «there is a desire to independently learn something

new, to develop own abilities, imagination. Such activity develops mental processes important for the child in the future, fine motor skills»; «helps children get to know the environment; pedagogues to find new forms of work for the comprehensive development of the child»; «preschoolers get to know the environment, expand their worldview, this contributes to the self-development of children. Also, experimentation has a positive effect on the emotional sphere, the development of creative abilities»; «preschoolers learn about the environment in an interesting and easy way for themselves. They develop interest in the environment, a picture of the world is formed, all mental processes develop»; «this is a very good way for a child to gain life and scientific experience by independently carrying out certain actions» and others.

To the question «Why, in your opinion, children's experimentation is not actively enough introduced in the educational process of the preschool education institution? » respondents gave the following answers:

- time constraints, insufficient amount of materials;
- educators' fear for the child's safety, lack of proper knowledge about children's experimentation and its proper organization;
- children really like research-experimental activities, so everything depends on the pedagogue's wishes;
- lack of literature and clear methodological recommendations regarding the organization of such type of activity as children's experimentation;
- pedagogues' underestimation of the importance of such activities for children; insufficient preparation both theoretically and methodologically; during experimentation, educators try to «get everything right» and thereby deprive preschoolers of the right to make a mistake;
- no equipment and conditions;
- traditional is not always effective, experimentation is an innovative type of children's activity;
- the initiative of educators is at a low level; material support of preschool education institutions is minimal;
- experimentation requires awareness and creativity of the pedagogue;
- a preschool education institution has a program according to which educators work, and introducing something new is problematic for pedagogues and children, especially early age children.

Discussion

Based on the analysis of the survey of pedagogues, we consider it necessary to note that during the implementation of various educational areas, prerequisites are created for the organization and implementation of experimentation in preschool education institutions. Although the fear of pedagogues to change the

traditional system of preschool education, namely the transfer of «ready-made» knowledge to children, is the main obstacle to the introduction of experimentation into educational practice.

The organization and implementation of experimentation as one of the leading types of children's activities into the educational process of preschool education institutions will ensure the development of cognitive interests and needs of preschoolers, as well as stimulate the development of all psychic processes and mental operations. It is the educator who motivates children, asks them problem-searching questions and tasks, organizes elementary research-experimental work, during which preschoolers independently master competencies that reflect the system of interrelated components of the child's physical, mental, social, and spiritual personality development and are formed according to all educational areas according to the Basic Component of Preschool Education (Karuk et al., 2021, 2022).

So, children's experimentation is a complex type of activity, during which the child's key competencies are formed, namely: personal, subject-practical and technological, sensory-cognitive, logical-mathematical and research, natural-ecological; abilities and skills oriented towards sustainable development arise: game, social-civic, speech, artistic-speech, artistic-creative. This activity is not given to a child by an adult in advance in the form of a scheme, but is built as new information about the object is obtained. And this is the basis of the extraordinary flexibility of children's experimentation, the ability of children to rearrange their activities depending on the results obtained. The activity of experimentation is characterized by the complication and development of goal-setting actions. The next important point of children's experimentation is that in order to achieve new goals set by the child, new ways of transforming objects are needed. Their search takes place by testing old methods, combining and rebuilding them. Therefore, trial and error is a mandatory and most important component of children's experimentation. Such activity is characterized by extreme flexibility, that is, the children are free from those restrictions that are offered by adults, as well as "obtrusive" purposeful learning. And therefore, children's experimentation also has a creative character, contributes to the formation of an extraordinary, creative personality.

So, the fundamental fact of children's experimentation is that it permeates all spheres of life of preschoolers and all types of children's activities. The leading motive of children during research-experimental activities is their focus on obtaining new knowledge, information about subjects and objects of the environment.

In order to introduce experimentation as a type of children's activity into the educational process, we have developed recommendations for preschool educators regarding the organization of children's experimentation:

1. Taking into account the age and individual peculiarities of children.

2. Determination of the content of children's experimentation in accordance with the developed skills, level of development of cognitive activity, abilities and interests of preschoolers.
3. Acquaintance and compliance of children with safety rules during experiments and tests.
4. Observance by the pedagogue and children of the stages of experiments and tests.
5. Prohibition on conducting tests and experiments that may harm the health of children and the environment.
6. Availability of special devices and materials placed in the children's experimentation center or mini-laboratory.
7. Systematicity in conducting children's experimentation.
8. Combination of children's experimentation with regime moments and other types of activities in a preschool education institution.

Currently, it is worth organizing work with children with experimentation, supplementing with materials from centers or mini-laboratories. Pedagogues of preschool education institutions should set themselves the following goal: to prepare children for school who are capable of creatively solving problems and tasks, expressing assumptions, and finding ways out of problematic situations. The criterion for the effectiveness of children's experimentation is not the quality of the result, but the characteristic of the process, which is objectified into intellectual activity, cognitive culture and valuable attitude to the real world. The given recommendations on the organization of children's experimentation are not exhaustive, they can be supplemented and complicated.

Since our research was carried out in the context of Jean Monnet Module EcoEdEU-101085524 «Ecological education of preschool and primary school children: a European approach» (the main purpose of which is to prepare future pedagogues to master the theoretical and methodological foundations of organizing the process of ecological education of preschoolers and primary schoolchildren) and PEGEU-101085248 «Preschool education in a green environment: the synergy of European practices and Ukrainian traditions» (the main purpose of which is to increase the competence of pedagogues, theoretical and practical training of students to organize work with preschool children in the conditions of green environment in combination of the best experience of Europe and Ukrainian traditions), we defined the main principles of training educators to organize children's experimentation in a preschool education institution:

- the principle of the contextual approach (which encourages modeling professional training based on real practical problems, using different contexts of professional activity, and allows students to see «the feasibility and necessity of knowledge and skills in everyday or future situations of professional activity» (Myronchuk, 2018):

- the principle of a multidisciplinary approach (which allows testing a wide range of ways of implementing professional activities (in our case – the organization of children's experimentation in a preschool education institution) from the standpoint of various theoretical and practical approaches of several sciences «A multidisciplinary approach provides consideration of a research problem from different points of view. Teachers analyze the data received in the educational process and react to them in accordance with the structure and specifics of the subject being taught. Such joint work has a number of advantages: expanding the knowledge of participants in the educational process, forming and developing key and professional competencies, more effective use of study time, developing motivation to acquire professional education...the possibility of discussion between participants in the educational process, obtaining new ideas, acquiring new knowledge and skills, positive impact on the professional career» (Boichuk, & Boichuk, 2020);

- the principle of the praxeological approach. «Implementation of the praxeological approach in the educational process of higher education institutions enables the formation of a set of professionally determined knowledge and practical skills of students, which is the basis of successful activity due to the conscious choice of methods, techniques and means of work that ensure the effectiveness of work, activate creativity, encourage active creative activity» (Dzhanda, 2019).

The implementation of the mentioned principles in the course of experimental work on the formation of future educators' skills in organizing children's experimentation in preschool education institutions allows to improve the quality of the general professional training of future pedagogues and contributes to the development of those important personal qualities of education seekers that motivate fruitful and creative cooperation with preschool children and preparing them for studying at school.

Conclusions

The trends of the implementation of children's experimentation in preschool education institutions in today's conditions are defined as: the use of children's experimentation to form the child's experience in various areas determined by the educational areas of the Basic Component of Preschool Education; expanding the contexts of the use of children's experimentation and its integration with the development of various personal structures: from observations and experiments in nature, with various objects of the physical world, to experiments with the word (speech development, children's occasionalisms), with an artistic image (moral-ethical, aesthetic development), with numbers and abstract concepts (the development of thinking operations); the emergence of the significant number of didactic methods and techniques based on the principles and algorithms of

children's experimentation; the creation of inherently innovative technology of the development of a child's engineering thinking, which is based on the concept of children's experimentation as a special form of perception of the world by a child.

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