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DYNAMICS OF MENTAL EDUCATION OF PRESCHOOL CHILDREN

Abstract. *The article presents the results of the control stage of the dissertation research and highlights the data obtained regarding the dynamics of mathematical development of older preschool children.*

The purpose of the article is to present the results of the control stage of the dissertation research and highlight the data obtained regarding the dynamics of mathematical development of older preschool children. The realization of the goal involves solving the following tasks: 1) to analyze the dynamics of mathematical development of older preschool children during the control stage of the pedagogical experiment; 2) to study and summarize the data obtained.

The following methods were used to solve the above-mentioned problem: analysis of philosophical, psychological-pedagogical and methodical literature on the research problem; methods of pedagogical diagnostics (a diagnostic technique for studying the level of mathematical development of older preschool children).

Based on the study of the initial level of mathematical development of older preschool children, game technology for the mathematical development of older preschool children was developed and implemented. The technology implementation process was based on a specially created integrated model, which provided for managerial, methodical and technological levels of its implementation. The purpose, tasks, content, forms and methods of organizing mental education for mathematical development of older preschool children were defined and implemented in the process of experimental and pedagogical activity, the result of which was the achievement of a high level of development by older preschool children.

The content of the formation of the levels of mathematical development was focused on the formation of cognitive, emotional, value and activity components, which acquired appropriate specifications. The success of the formation of high and sufficient levels of mathematical development was determined by the use of active forms and methods, the implementation of the optimal principles laid down as the basis of the game technology of mathematical development.

The stable dynamics of increasing the levels of formation of the mathematical development of older preschool children testifies to the pedagogical expediency and effectiveness of the developed and theoretically grounded game technology of mental education, as well as the pedagogical conditions for its effective implementation.

Key words: *children of older preschool age, intellectual education, mathematical development, cognitive interest, game technology.*

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Introduction. The relevance of the problem is determined by the requirements of regulatory documents regarding the modernization of the preschool education system in Ukraine, in particular, the development of logical and mathematical competence of preschool children. The Concept of the Development of Education of Early and Preschool Children states that “the tasks of preschool education are aimed at the personal growth of the child, the acquisition of preschool maturity in

various types of children's activities, the formation of basic competencies important for further development at the next levels of education, in particular communication, teamwork skills, creativity, critical thinking”.

Mental development of preschool children is an important modern methodical problem of preschool education. Mental development involves cognitive activity in the preschooler's development, which performs elementary mental actions (analyzes, compares, synthesizes, generalizes). Today requires creating the conditions for “a child to master elementary forms of research, experimentation, invention, to develop the ability to independently study the surrounding world, to rejoice in discovery” [3].

Analysis of modern research (O. Brezhneva, L. Zaitseva, M. Mashovets, T. Stepanova, A. Stolyar, etc.) showed that a new aspect is subject to scientific interest – the introduction of preschoolers into the world of logical and mathematical concepts: relations, operations on sets (unification, intersection, addition), logical operations, active learning methods using diagrams, graphs, combinatorics and visual modeling. For this, the following tools were used: models, schematic drawings and images, equivalents of objects “graphs”, etc., which significantly increased the cognitive interest of children.

In most preschool education institutions, the idea of the simplest logical training of preschoolers is implemented (A. Stolyar), the method of developing logical operations is used with the help of a special series of logical and mathematical games (L. Wenger, R. Govorova, Z. Mykhaylova, A. Stolyar), developmental games B. Nikitin [4].

According to K. Krutiy, logical literacy is “a child's fluent command of some complex of elementary logical concepts and actions, which constitute the alphabet of logical thinking and the necessary basis for its development” [5]. At the end of preschool childhood, such a child possesses to a certain extent logical concepts and actions (analysis-synthesis, comparison, classification, generalization, seriation, abstraction), and acquires skills in the field of language. The latter are purposefully formed and developed during several years of a child's stay in a preschool education institution.

Aim and tasks. The purpose of the article is to present the results of the control stage of the dissertation research and highlight the data obtained regarding the dynamics of mathematical development of older preschool children. The realization of the goal involves solving the following tasks: 1) to analyze the dynamics of mathematical development of older preschool children during

the control stage of the pedagogical experiment; 2) study and summarize the data obtained.

Research methods. The following methods were used to solve the above-mentioned problem: analysis of philosophical, psychological-pedagogical and methodical literature on the research problem; methods of pedagogical diagnostics (a diagnostic technique for studying the level of mathematical development of older preschool children).

Research results. Based on the study of the initial level of mathematical development of older preschool children, game technology for the mathematical development of older preschool children was developed and implemented. The technology implementation process was based on a specially created integrated model, which provided for managerial, methodical and technological levels of its implementation. The purpose, tasks, content, forms and methods of organizing intellectual education for mathematical development of older preschool children were defined and implemented in the process of the experimental and pedagogical activity, the result of which was the achievement of a high level of its development [4].

In the process of implementing game technology for the mathematical development of older preschoolers, the feasibility of its level implementation was proven. Thus, at the administrative level, the goal of creating a sensorial and cognitive environment for the child is ensured. The set goal made it possible to integrate the content of educational and cognitive activities, to form search-research, logical-mathematical competencies; and lay the basic foundations of worldview in children.

At the second, methodological level, the readiness of teachers to implement the tasks of children's mathematical development was ensured. Its task is the following: to identify and substantiate the essential, structural, content, and functional characteristics of the subject-mathematical competence of teachers. At the stage of training educators, their readiness to implement the tasks of mathematical development of preschoolers was formed, which was manifested at the level of motivational and personal, content and activity components. At the third, didactic, level, game technology was developed and implemented, which confirmed its effectiveness [4].

We consider the use of integration links to be an important achievement – one of the complex methodological tasks that we set and solved during the formative stage of experimental work. The implementation of the idea of integration required knowledge not only in the subject area of mathematics for preschoolers but also knowledge of the content of the program from other

educational lines, a complex formulation of educational tasks, the solution of which was found only in the interconnection of different fields of knowledge.

The content of the formation of the levels of mathematical development was focused on the formation of cognitive, emotional, value and activity components, which acquired appropriate specifications. The success of the formation of high and sufficient levels of mathematical development was determined by the use of active forms and methods, the implementation of the optimal principles laid down as the basis of the game technology of mathematical development.

The introduction of game technology in mental education of older preschool children in game activities in the conditions of preschool education institutions made it possible to investigate the general dynamics of the levels of mathematical development at the stage of the control stage of the research, which made it possible to determine the effectiveness of game technology of mental education. To identify the peculiarities of the mathematical development of older preschool children, an empirical study was conducted, in which 200 children participated (EG – 100 people; CG – 100 people). The obtained data are presented in Table 1.

Table 1.

Dynamics of mental development of children of older preschool age

Levels	Criteria					
	cognitive		emotionally valuable		active	
	EG	CG	EG	CG	EG	CG
high	18 %	9 %	17 %	3 %	22 %	5 %
sufficient	65 %	12 %	51 %	27 %	57 %	17 %
average	15 %	69 %	32 %	60 %	19 %	56 %
low	2 %	10 %	-	10 %	2 %	22 %

Let's visualize the obtained data in diagram 1 (Figure 1).

We characterize the obtained data. The game technology of mental education of older preschoolers ensured positive dynamics of all indicators of their mathematical development. We compare the obtained results according to the cognitive criterion and found that 18 % of the children of the experimental group are classified as high (only 9 % of the control group), 65 % of the children of the experimental group and 12 % of the control group are classified as sufficient, and 15 % of the children of the experimental group and 69 % of the control group are at the average level. groups 2 % of the children of the experimental and 10 % of the control groups belong to the low level.

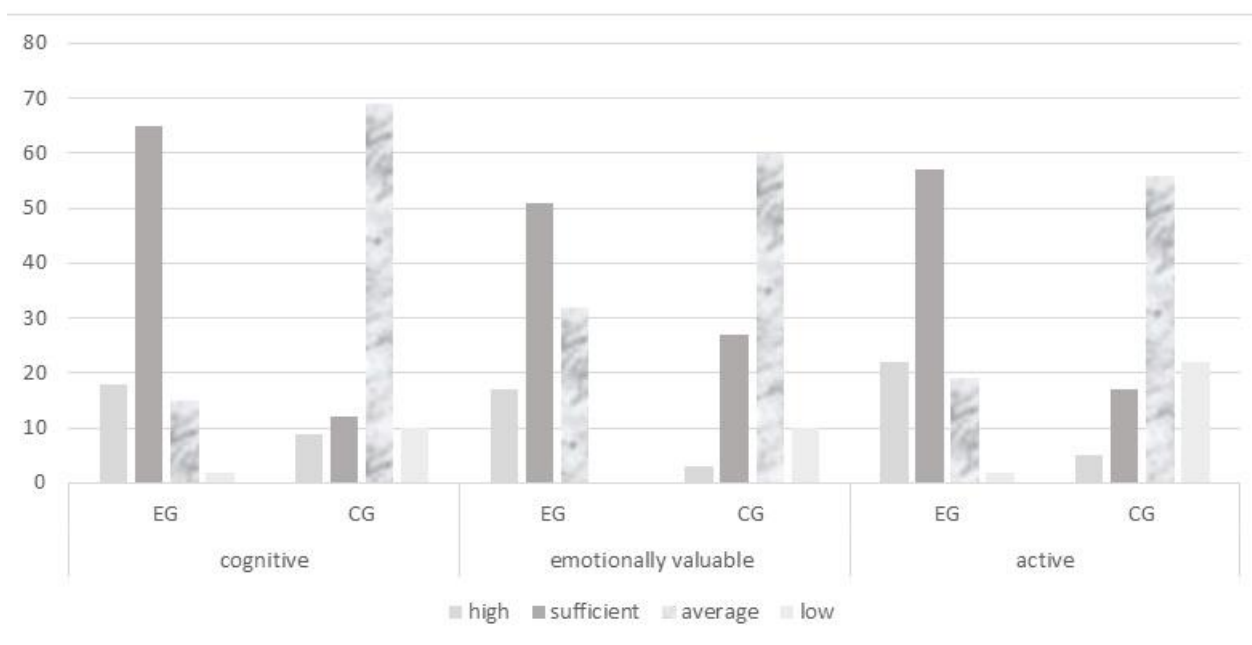


Figure 1. Dynamics of mental development of children of older preschool age

Thus, according to the cognitive criterion of mathematical development, it was found that children of older preschool age can recognize and name the perceived object as known based on existing experience; recognize objects and carry out their characteristics based on terms and designations with similar words and images.

Children are dominated by associative connections with tasks that are familiar to them, which are most often offered to them by educators during traditional education; insufficient formation of the ability to perceive the task, hear it and highlight the main signs was revealed; they have difficulty following instructions; identify ways of solving tasks; they have certain difficulties in understanding mathematical material.

According to the emotional value criterion, the following results were obtained: 17 % of the children of the experimental and 3 % of the control groups had a high level; accordingly, a sufficient level – 51 % of the children of the experimental and 27 % of the control groups; 32 % of the children of the experimental and 60 % of the children of the control group have an average level; a low level of 10 % was found in the children of the control group, while it was not found in the children of the experimental group.

According to the emotional-valuable criterion, it was found that older preschoolers have a sufficient level of emotional-valuable attitude to cognitive activity, which is related to cognitive

motivation, but they lack a constant desire to solve complex tasks, it is difficult for them to withstand mental stress for a long time.

The results of diagnostics according to the activity criterion showed that 22 % of the children of the experimental group and only 5 % of the control group have a high level of mathematical development; 57 % of experimental children and 17 % of control children have a sufficient level; an average level – 19 % of children of the experimental group and 56 % of children of the control group; a low level – only 2 % of the children of the experimental group and 22 % of the children of the control group. The obtained data on the dynamics of mathematical development of older preschoolers convincingly testify to the effectiveness of game technology in mental education.

According to the activity criterion of mathematical development, it is proven that children of older preschool age partially try to explain and generalize the signs of the studied mathematical concept, but they are not able to combine the elements of the understood into a single frame.

Discussion. The number of scientific and methodological approaches to ensuring the mathematical development of preschool children revealed during the theoretical analysis of the problem indicates the multi-faceted nature of research in this field both in Ukraine and abroad. Thus, scientists investigated the potential of methods of intensifying and optimizing children's mathematics education: subject actions were investigated as the basis for the formation of mathematical ideas (P. Halperin); the psychological mechanisms of counting as a mental activity, the genesis of the concept of number were studied (V. Davydov, M. Vovchyk-Blakytina, G. Kostiuk, M. Maklyak); approaches to the formation of ideas about sets in children (A. Markushevich, Zh. Papi), about magnitude, quantitative ideas in young children and ways to improve them in preschool children were analyzed (V. Danilova, L. Ermolaeva, K. Tarkhanova); the interrelationship of number and measurement was established (R. Berezina, N. Bilous, Z. Lebedeva, R. Nepomnyashch, O. Proskura, L. Levinova, T. Taruntaeva, K. Shcherbakova, etc.). The following aspects were the subject of research at different times: the use of visual modeling in the process of learning how to solve arithmetic problems (N. Nepomnyashcha); peculiarities of children's knowledge of quantitative and functional dependencies (L. Bondarenko, R. Nepomnyashcha, O. Kyrylova, etc.); development of abilities for visual modeling in learning spatial relations (R. Govorova, O. Dyachenko, T. Lavrentyeva, L. Khalizev, etc.); content and methods of mastering space-time relations (T. Museyibova, K. Nazarenko, T. Rykhterman, O. Funtikova, etc.); methods

and techniques of children's mathematical development through play (L. Artemova, T. Ignatova, Z. Mykhaylova, A. Smolentseva, I. Shcherbynin, etc.). The ideas of elementary mathematical training of preschoolers are implemented in the works of A. Stolyar. The search for ways to improve the methodology of teaching children mathematics was also actively carried out in the countries of Western Europe in the direction of the development of ideas about numbers in the process of practical actions with sets (D. Alhauz, E. Doom, M. Fidler, etc.); development of the concept of number and arithmetic operations as a basis for children's understanding of quantitative relations on specific sets (R. Grin and V. Lakson), etc.

Starting from the 90s of the 20th century, Ukrainian scientists studied the mathematical training of preschool children in a multifaceted way: they studied the peculiarities of time representations with the help of time models (O. Funtikova) [7]; didactic methods, forms, means of forming mathematical knowledge (L. Haydarzhiyska, M. Mashovets, L. Pletenytska, etc.); individual and differentiated approach to the formation of mathematical concepts in children (N. Baglaeva, T. Stepanova); cognitive activity as a factor in the mathematical development of older preschoolers (O. Brezhneva, K. Shcherbakova) [1; 8]; the theoretical and methodological foundations of the scientific and practical mastery of the natural and subject environment by older preschoolers, the potential of individualized mathematical development of the child (L. Zaitseva) [2] were studied; the peculiarities of the formation of mathematical concepts in the process of cognitive activity were studied (S. Tatarynova); peculiarities of the organization of children's science and mathematics education (A. Sazonova, V. Starchenko) [6]; computer technologies as means of teaching numeracy to older preschoolers (T. Pavlyuk) and others. Despite a fairly wide range of research on the mathematical training of preschoolers, most of them considered only certain aspects of children's mathematical development. In addition, a significant number of analyzed scientific works concern only older preschool age. However, there is an urgent need for a comprehensive study devoted not to individual issues of teaching preschoolers the basics of mathematics, but to the strategy and tactics of mathematical training aimed at the development of mathematical abilities.

The relevance of the creation of game technology for the mathematical development of preschool children is also confirmed by the analysis of the practical experience of preschool education institutions, which revealed that until now the adaptive-disciplinary model prevails in the education of preschoolers in mathematics, focused on the formal assimilation of knowledge,

memorization of mathematical material by the method of repeated repetition, which leads to negative consequences in the process of children's further learning of mathematics at school. Meanwhile, knowledge as a result of the learning process and mathematical development as a change in the psychological structure are not identical concepts, which explains accentuation as the key idea of ensuring the mathematical development of 6-year-old children.

Conclusions. The stable dynamics of increasing the levels of formation of the mathematical development of older preschool children testifies to the pedagogical expediency and effectiveness of the developed and theoretically grounded game technology of mental education, as well as the pedagogical conditions for its effective implementation. So, the goal was achieved and all the outlined tasks of the research were solved.

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ДИНАМІКА РОЗУМОВОГО ВИХОВАННЯ ДІТЕЙ ДОШКІЛЬНОГО ВІКУ

Анотація. У статті презентовано результати контрольного етапу дисертаційного дослідження та висвітлено отримані данні щодо динаміки математичного розвитку дітей старшого дошкільного віку.

Метою статті є презентація результатів контрольного етапу дисертаційного дослідження та висвітлення отриманих даних щодо динаміки математичного розвитку дітей старшого дошкільного віку. Реалізація мети передбачає розв'язання таких завдань: 1) проаналізувати динаміку математичного розвитку дітей старшого дошкільного віку під час проведення контрольного етапу педагогічного експерименту; 2) вивчити та узагальнити отримані дані.

Для вирішення означеної вище проблеми застосовували наступні методи: аналіз філософської, психолого-педагогічної і методичної літератури з проблеми дослідження; методи педагогічної діагностики (діагностична методика для вивчення рівні математичного розвитку дітей старшого дошкільного віку).

На засадах вивчення вихідного рівня математичного розвитку дітей старшого дошкільного віку було розроблено й упроваджено ігрову технологію математичного розвитку дітей старшого дошкільного віку. В основу процесу реалізації технології було покладено спеціально створену інтегровану модель, яка передбачала управлінський, методичний і технологічний рівні її реалізації. Були визначені та реалізовані в процесі експериментально-педагогічної діяльності мета, завдання, зміст, форми та методи організації розумового виховання з метою математичного розвитку дітей старшого дошкільного віку, результатом якого стало досягнення дітьми старшого дошкільного віку високого рівня його розвитку.

Зміст формування рівнів математичного розвитку був зорієнтований на становлення когнітивного, емоційно-ціннісного і діяльнісного компонентів, який набував відповідної конкретизації. Успішність становлення високого і достатнього рівнів математичного розвитку зумовлювалася використанням активних форм та методів, реалізацією оптимуму принципів, закладених в основу ігрової технології математичного розвитку.

Стабільна динаміка підвищення рівнів сформованості математичного розвитку дітей старшого дошкільного віку свідчить про педагогічну доцільність та ефективність розробленої й теоретично обґрунтованої ігрової технології розумового виховання, а також педагогічних умов її ефективної реалізації.

Ключові слова: діти старшого дошкільного віку, розумове виховання, математичний розвиток, пізнавальний інтерес, ігрова технологія.

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