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PROFESSIONAL TRAINING OF FUTURE MASTERS OF PRESCHOOL EDUCATION FOR THE FORMATION OF ENGINEERING SKILLS OF PRESCHOOLERS

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Abstract. The article is devoted to the theoretical substantiation of the expediency of preparing future masters of preschool education for the formation of engineering skills in preschool children; analysis of scientists' research on the problem of students' readiness for pedagogical activity. Some issues of training future masters of preschool education to organize the formation of engineering skills in preschoolers as a necessary component of future professional activity are presented. The readiness of future masters for the formation of engineering skills is interpreted as a special new component in the personality structure, which determines the direction and nature of professional and pedagogical activities, its focus on engineering training of preschool children, consistent actualization in emotional and volitional acts and relevant means of engineering. Innovative ways to improve the professional training of future specialists in the field of preschool education at the second (master's) level are identified, taking into account the formation of competencies defined in the educational and professional training program for masters of specialty 012 Preschool education. Methodical recommendations for future masters of preschool education on the formation of engineering skills in preschool children are given. The essence of engineering thinking is determined as well as the ways of its formation and development in preschool children in the process of relevant activities. LEGO-design and other types of technical creativity are highlighted. The algorithm of formation of engineering skills in children is singled out, which, according to the author, is carried out in stages: "I am a researcher", "I am a designer", "I am a specialist", "I am an artist". The system principles of cooperation of the preschool institution with parents for future masters of preschool education on the formation of engineering skills in preschool children are highlighted.

Keywords: future masters of preschool education, professional training, professional competence, engineering skills of children, preparation for professional activity.

1. INTRODUCTION

Reforms in higher education in Ukraine over the past five years are quite active, as evidenced by the autonomy of higher education institutions, diversification of curricula, academic freedom, a variety of forms of integration of science and practice, which enhances the ability of participants to generate ideas, conduct basic research etc. [12].

The consequence of this is the problem of preparing future masters of preschool education for

the formation of engineering skills in senior preschool children, which focuses on the need to use in the educational process of preschool education the most effective means of teaching and education. This is due to the revision of the main tasks of pedagogical activity, their adaptation to the principles that are being developed in our country.

The analysis of the scientific literature shows that in today's realities there is a growing need for highly qualified specialists in the field of preschool education who have professional mobility and are able to respond in a timely manner to socially predictable conditions.

The standard of higher education of Ukraine of the second (master's) level in specialty 012 «Preschool education» [14] states that graduates of higher educational institutions should be able to organize the educational process in preschool institutions using modern tools, methods, techniques and technologies. Therefore, specialists in the field of education need to master effective innovative technologies for their further application in professional activities.

Therefore, one of the priority tasks of higher education is the professional training of future masters of preschool education and, accordingly, the readiness of future educators to carry out the process we are researching.

2. RESULTS AND DISCUSSION

2.1. THEORETICAL PRINCIPLES OF PREPARATION OF FUTURE MASTERS OF PRESCHOOL EDUCATION FOR THE FORMATION OF ENGINEERING SKILLS IN PRESCHOOL CHILDREN

Theoretical analysis of the scientific literature allows us to define the concept of «readiness» as a holistic, relatively stable, personal structure that contains a set of interrelated motivational, cognitive-intellectual and operational determinants of continuous professional growth of teachers, which ensure optimal implementation of self-education in the professional activity of a teacher [10].

The problem of readiness for professional activity, determining the ways of its formation is considered in the works of many teachers, psychologists, sociologists. L. Artemova, G. Belenka, O. Boginich, S. Budak, N. Golota, M. Danylko, N. Levinets, I. Lutsenko, M. Mashovets, N. Matskevich, G. Sukhorukova and many others study the general theoretical foundations of this problem [3, c. 132].

Noteworthy are the scientific and pedagogical studies devoted to the development of conceptual foundations and implementation of STREAM education by T. Hrytsyshyna, S. Dovhyi, L. Zdanevych, K. Krutii, I. Savchenko, I. Stetsenko, O. Strizhak and others.

Therefore, the analysis of scientific sources on the topic proves that society and the technical world are inseparable in their improvement and progress. The world of technology has captured the whole sphere of human existence and absolutely does not give up their positions, but on the contrary only improves them all in new and new discoveries.

At the same time, psychological and pedagogical research does not stop in progress, which defines the concept of «readiness» relevant to our study as an active state of the individual, attitude to a certain behavior, mobilization of forces to perform the task. In practice, the formation of readiness is complicated by a passive attitude to the task, lack of action plan and intention to make the most of their knowledge and experience. Psychological readiness includes, on the one hand, a stock of professional knowledge, skills and abilities; on the other – personality traits: beliefs, pedagogical abilities, interests, professional memory, thinking, attention, pedagogical orientation of thought, ability to work, emotionality, moral potential of the individual, which should ensure the successful performance of professional functions [5].

Today, there are several scientific approaches to determining readiness: one considers it at the functional level and calls it readiness, others analyze it at the personal level and call it

preparedness. A personal-level approach allows to study the problem of readiness at a higher personal level. At the same time, training is understood as a component of personal qualities of a specialist in the intellectual, emotional and motivational components, as well as soft skills, which ensure compliance with the requirements and conditions of his professional activity [6].

Scientist M. Danylko [4] defines «readiness» as a consequence of professional training. This, in particular, applies to pedagogical activities, the readiness for which is carried out through the purposeful development of personality. According to V. Ananiev, readiness «begins to be formed before the beginning of professional work, and then develops together with professional ability to work, as the potential of the main activity...» [7, p. 125]. The problem of readiness for professional activity, determining the ways of its formation is considered in the works of many teachers, psychologists, sociologists. L. Artemova, G. Belenka, O. Boginich, S. Budak, N. Golota, M. Danylko, N. Levinets, I. Lutsenko, M. Mashovets, N. Matskevich, G. Sukhorukova and many others dealt with the general theoretical foundations of the mentioned problem [3].

In G. Belenka's research readiness is interpreted as a professionally important personality quality, which provides a stable combination of the following components:

- motivational (positive attitude to the profession, interest in it and other fairly clear professional motives);
- orientational (knowledge and understanding of the features and conditions of professional activity, its requirements for the individual as a specialist);
- intellectual (possession of methods and techniques of professional activity, the necessary knowledge, skills and abilities, processes of analysis, synthesis, comparison);
- strong-willed (self-control, ability to manage the actions that make up the performance of duties);
- evaluational (self-assessment of their professional training) [1].

According to official statistics, the field of engineering and technology is the area of the greatest deficit of modern society, so all parts of the educational chain have a goal – the development of relevant areas of education. Preschool education, in turn, seeks to form engineering thinking in the child, namely, to educate a creative person with the ability to think critically, orient in the world of high technical modernization and independent creation of new technical forms. What is engineering thinking?

Note that engineering thinking is a type of cognitive activity aimed at research, creation and operation of new high-performance and reliable equipment, advanced technology, automation and mechanization of production, improving product quality.

The pedagogical community of all levels of Ukrainian education has been actively involved in the process of modernizing the domestic system of engineering education. In today's world, an engineer is a highly qualified specialist who not only ensures the operation of complex mechanisms, but also shapes the world around him. The upbringing of a developed personality significantly depends on what to invest in this personality and how it will cope with it. What still contributes to the formation of engineering thinking in humans? First of all – the quality of the entire educational process, not only institutions of higher education, general secondary education, but also preschool education. It is well known that preschool education is the primary educational link on which the foundation of the future personality is laid.

Let's deal with the essence of engineering thinking in humans. The thinking of an engineer contains not only data, information, formulas, it is based on the ability to independently build an algorithm of actions, the sequence of product manufacturing.

Readiness for the formation of engineering skills in preschool children is the result of preparation of future masters of preschool education in higher education institutions for professional and pedagogical activities, taking into account the degree of their preparedness for engineering concepts. The readiness of future masters for the formation of engineering skills means

a special new structure in the personality structure, which determines the direction and nature of professional and pedagogical activities, the tendency to perceive future activities in engineering training of preschool children, its consistent actualization in emotional and volitional acts. This readiness is objectified in the reflection of environmental phenomena and their relations in engineering language and means of engineering. Included in the sphere of consciousness of the future master of preschool education, readiness provides him with effective implementation of engineering activities, transformation and adaptation to the conditions of use in the process of education and training of preschool children [11].

The formula of engineering thinking is as follows: knowledge, skills, experience in professional activities plus the ability to work independently, agility, ingenuity, creativity, responsibility, ability to analyze, predict. Engineering thinking is an active form of creative thinking. The formation of engineering thinking is facilitated by the formulation and solution of practical professional problems.

Engineering thinking combines different types of thinking: logical, creative, figurative, practical, theoretical, technical, the last three of which are perhaps the most important, although they all begin to form in preschool. Today, in order to keep up with new discoveries and keep up with the latest technologies, our education must make many important improvements and give children the opportunity to realize their dreams and plans, which are beginning to form in them in preschool [2, p. 4 .].

Engineering thinking of preschoolers is formed on the basis of scientific and technical activities, such as LEGO-design and other types of designing; rationally expressed as a product of activity; systematically formed in the process of scientific and technical creativity; tends to spread to all spheres of human life.

Thus, the formation of engineering skills is a purposeful and organized process of transfer and assimilation of knowledge, as well as ways of mental activity (in the field of engineering).

According to N. Freyah [14], the main tasks of the development of engineering skills as a scientific field are:

1. Scientific substantiation of program requirements to the level of formation of engineering skills in preschool children in different age groups.

2. Determining the content of didactic material that will promote the formation of engineering skills.

3. Development and implementation in the practice of preschool education of effective methods and various forms of work organization for the development of engineering skills in children.

4. Implementation of continuity between preschool institutions and primary general secondary education in the formation of engineering skills in children.

5. Development of the content of future masters' training of preschool education, capable of educational activities in engineering development of preschool children.

6. Development of guidelines for parents on the formation of engineering skills of children in the family.

It is worth noting that children begin to engage in LEGO-design, usually from 4-5 years. The inclusion of children in systematic design activities at this stage can be considered one of the important conditions for the formation of the ability to perceive the external properties of the material world (size, shape, spatial and dimensional relations). At the age of 5-6 years, children have ample opportunities for design activities. This is facilitated by the strong development of various technical methods of designing. Children build not only on the basis of demonstration of the method of fastening parts, but also on the basis of independent analysis of the finished sample, the ability to keep the idea of the future building [11].

2.2. PRACTICAL APPROACH IN THE PROCESS OF FORMATION OF ENGINEERING SKILLS IN PRESCHOOL CHILDREN

In order for a child to develop, it is important to properly organize its activities. Therefore, the key educational task is to organize conditions that will promote children's thinking and provoke the child to certain actions. By designing we mean not only the use of game material, such as LEGO, but also a productive activity that involves building an object, comparing various individual objects, elements of building material and parts of the designer, making products from cardboard, paper, waste and natural material. The above allows us to identify the following forms of organization of children's education during the formation of engineering skills:

1. Designing according to the sample. The child begins to analyze the general details, possible options for attachments, shapes and volumes of the presented sample, learns its location in space, gets acquainted with three-dimensional and planar figures.

2. Modeling. The form of work develops the ability to disassemble a three-dimensional figure into details in your imagination in order to understand what components were used to create it. This form of activity will help to reproduce the proposed model as accurately as possible.

3. Conditional designing. The child builds a certain object, without having any sample, but is guided in the process by clear conditions, which an adult talks about. At the same time, the preschooler must independently analyze which subject or object will be appropriate to create under this condition. This form of work promotes the development of creative thinking.

4. Designing according to schemes. Develops cognitive abilities, because the child, having only certain drawings, must form a three-dimensional figure that will correspond to the set pattern.

5. Designing on the specified topic. During this form of work, the child is limited in subject matter, but can choose which object to build and from what material.

6. Designing from waste material. It can be implemented from an early age, as children build almost all the time during the game. For example: studying the topic «Farm», children build a fence for animals from sponges.

7. Designing from a constructor which has different fasteners. This type of activity is one of the most difficult, so we propose to implement it for senior preschool children, because to perform such a task the child must have sufficient knowledge and some life experience. The child should be guided by what it is possible to use these or those elements of the constructor and how to combine it into one composition.

8. Designing of BIG bricks. Introducing this form of work, it is best to acquaint preschoolers with the location of objects in space: children learn how to build a tower so that it was strong and high enough etc. [8].

According to our beliefs, engineering skills should be formed according to a certain algorithm, which we see in the separation of certain stages in the formation of our research skills: «I am a researcher», «I am a designer», «I am a specialist», «I am an artist». Let's briefly analyze these stages.

«I am a researcher» – at this stage the child begins to get acquainted with different types of constructors, masters basic skills in working with a constructor, learns to visually and tactilely determine the size of figures, their features, builds an associative series that promotes not only engineering skills but critical thinking as well;

«I am a designer» – this stage involves the improvement and refinement of existing elements and forms created from the constructor. The child begins to create unique objects, improves their knowledge, skills and abilities in the design process.

«I am a specialist» – a child has a broad outlook in the field of designing, can not only use the constructor to perform a task, but also adds other materials such as natural, waste materials, details of decoration, can work with schemes of varying complexity.

«I am an artist» – a child can easily and quickly create a new «product», as soon as he hears the topic, the preschooler orients himself in research activities, easily integrates subbjects and objects that he creates in everyday life, can tell a story about the subject he created.

In order to implement the above algorithm for the formation of engineering skills in preschool children, we offer guidelines for future masters of preschool education:

1. Studying the interests and needs of children. No activity will be effective if it does not interest preschoolers. Therefore, it is necessary to choose such forms and methods of work that will be able to best reveal the potential of children, namely the age group to which it is aimed.

2. Choosing available material that will be interesting and appropriate to the age characteristics of children.

3. Adherence to the principle of systematization and continuity in children's education and their acquisition of knowledge, skills and abilities.

4. Paying attention to the personality-oriented approach in the formation of engineering skills.

5. Involvement of children in practical activities: when we talk about the designing and direct formation of engineering skills – we must understand that this rule will be one of the key.

6. Creating a proper material and technical base.

7. Creating a situation of success, which consists in the fact that preschool children must show a creative approach to solving the problem before them.

8. Conducting group and individual interviews with children.

An equally important component in the formation of engineering skills in preschool children is the work of the educator with parents. We offer future masters of preschool education to use the following system as a basis for cooperation of preschool education institutions with parents:

1. Conducting individual and group consultations: «How to acquaint children with the world of professions», «Constructorss and their varieties», «The importance of the profession of an engineer», «The role of designing in the development of preschool children», «Subjects around us and their importance» .

2. Production of mobile folders (for example, «We design, play, develop children», «Types of constructors and the importance of their use», «Waste material and its capabilities», «Designing is interesting and affordable»).

3. Conducting meetings for parents: «Development of engineering skills in senior preschool children», «Formation of critical and creative thinking with the help of various constructors».

4. Arrangement of a jointly created photo exhibition of family creativity «Young Technician» or «Mother, Father and I – an engineering family» in the group center.

5. Creation with the participation of parents and children of a video on the topic: «Young Engineer»;

6. Conducting master classes, quests using LEGO – DUPLO and LEGO Education.

3. CONCLUSIONS

The analysis of scientific research and own practical experience in the field of preschool education makes it possible to emphasize the importance of the problem of professional training of future masters of preschool education to the formation of engineering skills in preschool children.

The introduction of modern, but at the same time effective, forms and tools in the preparation of future masters of preschool education can serve as a basis for innovative experience in the world of preschool education.

The results of the analysis allow us to conclude that for the effective functioning of the system of professional training of future masters of preschool education is relevant not only to create conditions for such training in higher education, but also to ensure proper attention to acquiring practical skills and abilities to use modern ones, practice-oriented forms and technologies of education for the

formation of engineering skills in preschool children, which, in turn, requires further research in this area.

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Дяченко Наталія. Фахова підготовка майбутніх магістрів дошкільної освіти до формування інженерних умінь у дітей дошкільного віку. Журнал Прикарпатського університету імені Василя Стефаника, **9** (1) (2022), 188–195.

Стаття присвячена теоретичному обґрунтуванню актуальності підготовки майбутніх магістрів дошкільної освіти до формування інженерних умінь у дітей дошкільного віку; аналізу досліджень науковців з проблеми готовності студентів до педагогічної діяльності. Представлено деякі питання підготовки майбутніх магістрів дошкільної освіти до організації формування інженерних умінь у дошкільників як необхідної складової майбутньої професійної діяльності. Готовність майбутніх магістрів до формування інженерних умінь трактується як особливе новоутворення в структурі особистості, що визначає спрямування та характер професійно-педагогічної діяльності, її орієнтування на інженерну підготовку дітей дошкільного віку, послідовну актуалізацію в емоційно-вольових актах та відповідних засобах інженерної діяльності. Визначено інноваційні способи підвищення фахової підготовки майбутніх фахівців у галузі дошкільної освіти на другому (магістерському) рівні з урахуванням формування компетентностей, визначених в освітньо-професійній програмі підготовки магістрів спеціальності 012 Дошкільна освіта. Подано методичні рекомендації для майбутніх магістрів дошкільної освіти з формування інженерних умінь у дітей дошкільного віку. Визначено сутність інженерного мислення та висвітлено шляхи його формування і розвитку в дошкільнят у процесі відповідної діяльності, як LEGO-конструювання та інші види технічної творчості. Виокремлено алгоритм формування інженерних умінь у дітей, що, на думку автора, здійснюється за етапами: «Я – дослідник», «Я – конструктор», «Я – фахівець», «Я – митець». Висвітлено системні засади співпраці закладу дошкільної освіти з батьками для майбутніх магістрів дошкільної освіти щодо формування інженерних умінь у дітей дошкільного віку.

Ключові слова: майбутні магістри дошкільної освіти, фахова підготовка, професійна компетентність, інженерні уміння дітей, підготовка до професійної діяльності.