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PECULIARITIES OF EXPERIMENTAL AND RESEARCH ACTIVITIES IN CLASSES WITH PRESCHOOLERS

Annotation. The current situation of human development is the situation of non-standard, uncertain tasks, a situation where we have to deal with unreliable information, take into account the points of view of real and potential partners. It requires from each individual an exploratory attitude towards the outside world. The principal feature that determines the specifics of cognitive activity of man in modern conditions is that there is a constant need to manage immediately a multitude of new and diverse objects and phenomena associated with each other. Therefore, now we need another system of organization of cognitive activity - qualitatively higher level. A modern child should actively explore the novelty and complexity of a changing world, create, invent new, original strategies of behavior and activities. This active cognitive attitude to reality should be formed from childhood.

The authors proposed their way to solving this problem through the organization of search and research activities of preschool children, which is considered as a powerful innovative educational technology - a means of solving educational problems in the modern society, a means for the translation of norms and values of the scientific community into the educational system, the means of replenishment and the development of the intellectual potential of society.

The article analyzes contemporary ideas about research training; forms of organization and methods of experimental learning are disclosed; the stage of research search of a child is described; sequence of research with children; the possibilities of organizing experimentation in various kinds of children's activities are considered; algorithm for preparing and conducting an experiment-class;

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structure of the occupation-experiment; Examples of experiments and experiments for children are given.

Keywords: researching, experimentation, activities, preschoolers, education.

Development of intellectual abilities of children of preschool age is one of the topical problems of our time. In order to avoid the development of intellectual passivity in children, it is necessary to develop productive forms of thinking in preschool children.

The development of a child is a complex process and for each individual is characterized by a number of features that are determined by the differences in the genetic code. These circumstances determine such a wide polymorphism of individuals, but at the same time, with all the diversity of development, includes a number of general laws.⁴

One of the most effective methods of work is search activity, namely experimentation. The more diverse and intensive the search activity, the more new information the child receives, the faster and more fully it develops. In this activity, the most pronounced processes of goal formation, the processes of the emergence and development of new motives of the individual, underlying the self-development of preschoolers, the child develops curious, independent, with creative thinking.

In the opinion of educators and psychologists, the child's personality develops in gambling activities that are most accessible to the child, since most of all it corresponds to its mental and physical characteristics. In game activities, the preschool child's speech, its feelings, perception, emotional sphere are enriched, because of the game the child takes possession of the whole system of human relations.⁵

Studies allow the child to find answers to the questions "How?" And "Why?". Elementary experiments, experiments help the child to acquire new knowledge about this or that subject. This activity is aimed at a real transformation of things, during which the preschooler will know their properties and connections, which are not available in direct education. The knowledge gained during the experiments is remembered for a long time. Research activity is a special type of activity and one of the most important sources for the child's conception of the world.

Its main goal is to form the skills of the child independently, creatively to master and rebuild new ways of activity in any sphere of human culture.

Therefore, preparing a child for research, learning her skills and research skills is becoming the most important task of modern education. The main instrument for the development of research

⁴O.B. Polevikova, T.A. Shvets, Preschooler ontogenesis as a ground for the development of its personality/The 9th International conference —Science and societyI (February 1, 2019) Accent Graphics Communications & Publishing, Hamilton, Canada. 2019. – 60-69 pp.

⁵O.B. Polevikova, T.A. Shvets, Organization of different kinds of play with preschoolers /The 7th International youth conference —Perspectives of science and educationI (February 15, 2019) SLOVO\WORD, New York, USA. 2019. – 324-333 pp.

activities in education is the research method of teaching. For the formation of a culture of thinking and development of abilities and skills of research activities, preschoolers must be given tasks that are oriented on certain tasks. They can be grouped into the following blocks:

- learn to see problems;
- learn to put forward hypotheses;
- we learn to draw conclusions and inferences.

The need for a child in new experiences lies at the basis of the emergence and development of inexhaustible search activity, aimed at knowledge of the world around. The more diverse and intensive this activity, the more new information the child receives the faster and more fully, it develops.

In the process of organization of cognitive and experimental activities, the following tasks are foreseen:

- creation of conditions for the formation of a holistic outlook of the child by means of experimentation;
- development of curiosity, ability to compare, analyze, generalize;
- development of cognitive interest in the process of experimentation, the establishment of cause-effect dependence;
- ability to draw conclusions, as well as: development of attention, perception, thinking.

Consequently, the main advantage of the method of experimentation is that it gives children a real idea of the various aspects of the object under study, its relationship with other objects and the environment of existence.

In the preschool classroom or in the university research laboratory, science is an active and open-ended search for new knowledge. It involves people working together in building theories, testing those theories, and then evaluating what worked, what didn't, and why.⁶

Children's experimentation is not an isolated activity. It is closely connected with all kinds of activities, and, above all, with such as observation and work. On the other hand, the presence of children's work skills and observation create favorable conditions for experimentation, on the other - experimentation, which causes a child of great interest, contributes to the development of observation and the formation of work skills.

By organizing the research and development of children, we relied on the following steps:

- Problem situation.

⁶Kathleen Conezio, Lucia French, Science in the Preschool Classroom Capitalizing on Children's Fascination with the Everyday World to Foster Language and Literacy Development, https://www.researchgate.net/publication/237714574_Science_in_the_Preschool_Classroom_Capitalizing_on_Children's_Fascination_with_the_Everyday_World_to_Foster_Language_and_Literacy_Development, [September 2002].

- The problem, its wording (the discovery of obscure phenomena - the problem setting).
- Submission of hypotheses.
- Selection of material for checking hypotheses.
- Examination of hypotheses.
- Formulation and drawing up of a conclusion.

The problem situation is a situation, in which a child wants to solve some complicated tasks, but she lacks data and she has to look for herself.

To create problem situations, we used the following methodical techniques:

- Making a contradiction and addressing children with a proposal to independently find a way to solve it;
 - Presentation of different points of view on the same question;
 - Suggesting children to consider the phenomenon from different positions.
 - Encouraging children to compare, synthesize, and draw conclusions.
 - Setting specific questions for generalization, logic.
 - Problem-solving tasks (with insufficient or excessive data, uncertainty of the issue, contradictory data, with specially made mistakes, limited execution time).

We have used the following algorithm for training and conducting an experiment:

1. Previous work (excursions, observations, conversations, reading, review of illustrative materials, sketches of individual phenomena, factors) on the study of the theory of the question.

Definition of the type, type and subject of the class - experiment.

2. Choosing goals, tasks of working with children (as a rule, these are cognitive, developmental, educational tasks).

3. Game training for the development of attention, perception, memory, logic of thinking.

4. Preliminary research work using equipment, manuals.

5. Selection and preparation of manuals and equipment, taking into account the season, age of children, the subject under study.

6. Summarizing the results of observations in various forms (diaries of observations, collages, tables, pictures, pictograms, narratives, drawings) in order to bring children to independent conclusions based on the results of the study.

Also, they relied on the following structure of the lesson-experiment:

1. Setting up a research task in the form of one or another variant of the problem situation.
2. Training of attention, memory, logic of thinking (it can be organized before the lesson).
3. Clarification of the rules of safety and life.
4. Clarification of the research plan.
5. The choice of equipment, its independent placement by children in the study area.

6. Association of children in a subgroup, the choice of leading, captains, helping to organize peers who comment on the course and results of the joint activities of children in groups.

7. Analysis and generalization of the results of experiments obtained by children.

We will demonstrate the methodology for carrying out studies on concrete examples.

Classes on the topic: Infusion of soap bubbles

Objective: To teach how to make soap bubbles; to get acquainted with the fact that when the air enters a drop of soap water forms a bubble.

Materials: Plate (tray), glass funnel, straws, sticks with rings at the end, soap solution in the container (do not use toilet soap).

Experiment progress

An adult pours into a plate or a tray of 0.5 cups of soap solution, puts an object (for example, a flower) in the middle of the dish and covers it with a glass funnel. Then blow into the tube of the funnel and, after the formation of a soap bubble, cantes the funnel and releases bubble from under it. The plate should have an item under the soap dish (you can blow through a small bubble into a large bubble with small bubbles). An adult explains to children how the bubble leaves, and invites them to infuse themselves with soap bubbles. Together, they consider and discuss: why increased in size bubble (there penetrated the air); where did the air come from (we breathed it out from ourselves); why some bubbles are small, and others are large (different amounts of air).

Wind on the sea is walking

Purpose of experience: Identify the air.

Materials: A pond with water, a sailboat model.

Air is all around us, and invisible, which makes it an interesting and challenging science concept to preschoolers. Engaging activities about air helps teach young kids about all the things that air benefits. Air activities can be used alongside lessons about the environment, the changing seasons and music and movement.⁷

Experiment progress

An adult drops a sailboat on the water, blowing on a sail with varying strength. Children watch the sailboat movement. Find out why the boat that pushes it (the breeze) floats; from where the wind-air is taken (we exhale it). Then the competition "Whose sailor is more likely to flow to another region" is held. The adult discusses with the children how to blow the sailfighter faster or longer to swim (to gain more air and to breathe much or to exhale it longer). The adult then asks

⁷Sarah Lipoff, Science Activities on Air for Preschool Ages, <https://sciencing.com/science-activities-air-preschool-ages-6468647.html>, [25.04.2017].

children why there are no air bubbles when we blow on a sail (bubbles are formed if "air" is blown into water, and then it rises from the water to the surface).

"Balloon and Straw Games"

Goal: Continue to introduce children to the fact that there is air in the human body and to detect it; enrich the active dictionary of children: elastic, soft, inflatable. Fix knowledge of children about the properties of air.

Materials Two balloons (one inflatable weakly - soft, the other inflated strongly is elastic), air balloons, water containers - for each child.

Experiment progress

The teacher, along with the children, considers two balloons. Children play with both balls and figure out which one is better to play and why (with the one that is better for inflating, as it is easily reflected, flies, smoothly drops, etc.). Discuss the cause of the difference in properties: one is elastic, because it is heavily inflated, and another - soft, because the inflated is weak. The teacher invites children to think what to do with a soft ball, so that it is also good to play with it (more inflatable); inside the ball (air); where the air is taken (it is exhaled).

The teacher shows how a person inhales and breathes air, putting his hand under the jet of air. Finds out where the air is taken inside a person (his exhale).

Inflate the soft ball so that it becomes elastic, lower it through the opening into water to see how the ball is blown off and goes through air bubbles. Children repeat the experiment on their own.

With the help of the educator, the children conclude that inside the person is the air that it breathes in from the outside and gradually exhales. Inside the inflated balloon, there is also air that got there during the exhalation of a person. The more air the ball is, the more elastic it is.

The purpose of search and experimental activity of preschoolers: development of cognitive interests, needs and abilities, independent search activity based on the enriched and formed emotional and sensory experience.

Task:

- Cause interest in search activity.
- Teach children to see and highlight the experiment problem.
- To accept and set the goal of the experiment.
- Choose tools and materials for self-employment.
- To develop personal qualities: purposefulness, persistence, determination.
- Enrich consciousness with meaningful, orderly information about the world.

In their activities should be based on the leading principles of the development of preschool children:

- Principle of psychological comfort: is to remove stress factors;
- Principle of environmental compatibility: development according to the nature of the child, his health, mental and physical constitution, his abilities and inclinations, individual characteristics, perceptions;
- The principle of a differentiated approach: the tasks of effective psychological assistance to the pupils in improving their personality are solved; they help to create special pedagogical situations that help to reveal the psychophysical, personality abilities and possibilities of pupils;
- Principle of activity: involvement of the child in the game, cognitive, search activity in order to stimulate an active life position;
- Principle of creativity: maximum orientation to the creative beginning in gaming and productive activities of preschoolers, gaining her own experience of creative activity;
- The principle of integration: the integrity of all processes implemented in the educational space (education and upbringing, development and self-development, the natural and social sphere of the child, children and adult subculture).

The shock to the beginning of experimentation is often a surprise, curiosity, someone's problem or request is put forward. Therefore, all existing variations of experiments should be used in the work:

- Random observations and experiments (not requiring special training, conducted by impromptu in the situation that occurred at the time when children saw something interesting);
- Planned observations and experiments (pre-planned);
- Experiments as a response to children's issues (conducted as a response to a child's question). The fact that children do not receive direct answers to questions stimulates their intellectual development, curiosity of the mind, and the ability to find an answer in an experienced way.

So, in an early childhood, the child intuitively acquaints the world with a sense of perception. Attention children of two years attracts a variety of items. The kid examines objects in a variety of ways: twists, shakes, throws, etc. In the vast majority of cases, this does not even require special equipment. The study is subjected to plants, animals, people, objects of inanimate nature.

Child experimentation is quite easy to integrate with many types of childhood activities.

Gradually elementary experiments become game-experiments, in which, as in didactic games, there is a cognitive part and is interesting.

For safe studying with children, rules are developed, works of materials (allow and prohibitive signs); schemes for the successful implementation of the experiment. Each child has a "Scientific Diary", which records the child's work.

Tasks of pedagogical work

Instruct children to notice seasonal changes in nature: weather phenomena (rain, snow, etc.), changes in the appearance of plants and behavior of animals (leaf blooms, flowers, the appearance of primrose, flying or flying birds, etc.), teach children to highlight interesting objects (the beauty of the droplets of rain on the leaves or the trees in the frost, etc.).

To help establish causal relationships in nature: between the phenomena of nature ("plants, insects" appear with the first heat, etc.), between the state of the objects of the environment ("plants need water, light, soil", etc.).

Initiate manifestations of emotional and positive attitude towards the environment, the desire to share their impressions with adults and other children, the ability to admire the beauty of nature.

Contents of pedagogical work

The educator forms the children's first ideas about the interrelationships in nature on the simplest examples from the nearest environment ("Plants in the flower bed need water, light, heat, soil, different insects - butterflies, grandmothers, beetles, bees", "In the soil live rain worms that loosen the ground", "Trees water the rain, and they grow well"), about the simple connection between weather phenomena and their consequences ("During the rain it is damp, the sand becomes wet, puddles appear" etc.).

Familiarizes children with some signs of seasonal phenomena (snow falls in the winter, snow is fluctuating in the winter (loose, dense, etc.), the water in the frost freezes, so you can build ice slides; in the spring, the sun shines brighter, more birds are sown, vegetables are planted in the cities, flowers are flowers, in the autumn it becomes colder, the yellow leaves fall from the trees, rains are going on, the crops are harvested in the cities, etc.); he also arranges the observation of seasonal changes in accordance with the signs (it becomes cold, yellow leaves, the sun shines, streams streaming, the first flowers appear, leaves fall, etc.), which promotes the development of children's first generalizations about the seasons.

The teacher, together with the children, indicates the results of his observations in various activities (drawing, application, game). The mentor invites them to listen to fragments of children's musical compositions resembling the sound of rain, singing birds, listening to them sounds of living nature.

Educates at children's emotional attitude to nature ("Look, what beautiful flowers have grown up in our corner of nature," "Let's help the plant, or it can dry up").

Experimental work causes the child's interest in the research, develops mental operations (analysis, synthesis, classification, generalization, etc.), stimulates the cognitive activity and curiosity of the child, activates the perception of the educational material.

In everyday life, children often experiment with different substances, trying to learn something new. They disassemble toys, watch objects falling into water, try to tongue metal objects

in a strong frost, and so on. But the danger of such "amateur" is that the preschooler is not yet familiar with the laws of mixing substances, elementary security rules.

The experiment, specially organized by the teacher, is safe for the child and at the same time introduces it to the various properties of the surrounding objects, with the laws of the life of nature and the need for them to be taken into account in their own life. At first, children learn to experiment in specially organized activities under the direction of a teacher, then the necessary materials and equipment for the experiment are introduced into the space-subject environment of the group for independent reproduction of the child.

All group space is desirable to be distributed to centers that are accessible to children. In addition to nature centers in groups where children watch and care for plants, in all groups it is necessary to equip experimental centers for elementary experiments and experiments. Research tasks are specific to each age.

At junior preschool age it is:

- immersion of children into problematic game situations (leading role of the teacher);
- activating the desire to seek solutions to the problem situation (together with the teacher);
- the ability of a dusty and purposeful survey of the object;
- formation of initial prerequisites for research (practical experiments).

The senior preschool age is:

- formation of preconditions for search activity, intellectual initiative;
- developing the ability to identify possible ways to solve a problem with an adult, and then on their own;
- formation of the ability to apply these methods that contribute to solving the problem, using various options;
- development of the desire to use special terminology, conducting constructive conversation in the process of joint research activity;
- ability to put forward hypotheses and formulate conclusions independently.

In experimenting with preschoolers, the following points must be taken into account:

- All proposed measures should be emotionally colored, to cause children positive emotions and desire to act.
- For preschool children, the topical principle of repetition is important, therefore, it is possible and necessary to return to many activities in the process of work, even to attribute them to the rank of traditional ones.
- At one time you can consider one of the properties in its various combinations or one item with different properties.

It is necessary to understand that in the process of independent activity the child carries out not simple, but a multilevel experiment:

Physical: Learning to manage your body and individual organs;

Natural science: acquaints with the real world around us, with the properties of objects and causal links in the world;

Social: memorizes the individual characteristics of each person (peer and adult), the form of interaction of people with each other;

Cognitive: trains mental processes, develops a variety of mental operations;

Linguistic: engaged in word-formation, discusses the results of an experiment, plays verbal games, experiments with words, etc.

Personal: find out about your personal capabilities;

Behavioral: simulates its behavior in different life situations.

Thus, child experimentation is not isolated from other activities. It is closely connected with all kinds of activities.

The research activity is one of the stages of the project method. We raise the problem and outline the strategy and tactics for solving it; the child in conjunction must find the decision with adults in the process of research and observation and experiment implementation. It is worth emphasizing the creation of conditions for independent experimentation and search activity of the children themselves. Research activities are of great interest to children.

The task of the educator is to support this interest and create conditions for search activity and elementary children's experimentation.

In groups, laboratories are created - a place where children themselves engage in research activities. All equipment for conducting experiments should be safe.

Children used objects: objects of different texture, wood, metal, paper, fabric, bulk substances, funnel, water, sand, iron balls of various sizes, cups, magnets, threads, etc.

The direct contact of the child with objects or materials, elementary experiments with them allow them to know their properties, qualities, possibilities, awaken curiosity, the desire to learn more, enrich the bright images of the surrounding world.

During research, the preschool child learns to observe, reason, compare, answer questions, draw conclusions, establish causal relationships, and observe safety rules.

The educator should have the items that he himself uses during complex experiments: test tubes, alcohol, glass. He collects interesting information, riddles, situations that can be offered to children at one time or another. The content of the experiments should be interesting for children, accessible by age.

To support interest throughout the course of experimentation, experiments are offered on behalf of the game characters.

In the first stage, the game characters in the process of joint activities under the guidance of educators model problem situations. Subsequently, the children learn to independently set the goal, to put forward hypotheses, to think through the methods of its verification, to carry out practical actions, to draw conclusions.

Senior preschool age. This period of development of the child - one of the crucial stages, which lay the foundations of knowledge about the world around, physical properties of objects of inanimate nature, the relationships and relationships between them. This period is a step in the system of continuous natural science education, the purpose of which is to most fully disclose to children the enormous, vast, incomplete wonder of the world that surrounds them, with which they face each day, in which they must live.

Task of cognitive-research activity:

- use cognitive-research activity as the basis for cognitive development of a child;
- ensure that preschoolers master the basic forms of organizing the experience (causal, spatial and temporal relationships) and the transition from systematization of experience at the level of practical action to the level of symbolic action (schematization, symbolization of relationships and relations between objects of the surrounding world);
- stimulate children to compare, search for similarities and differences, relationships of things and phenomena, to verbal analysis-reasoning;
- develop the cognitive initiative of preschoolers (curiosity), independent research activities through partnership with adults;
- broaden the child's outlook, bringing it beyond direct practical experience to a wider spatial and temporal perspective.

The starting point for self-activity is the information received by children in classes or joint activities with a teacher or parents, which "small researchers" "check" in independent experimental work on the basis of trial and error. Observations of practical work show that gradually elementary experiments become gaming-experiments, in which, as in the didactic game, there are two aspects: educational-cognitive and game-related. The game motive increases the significance for the child of this activity. As a result, knowledge of the connections and quality of natural objects fixed in game-experiments becomes more conscious and strong.

Conclusions: It is now necessary to organize work with children on experimentation, to replenish the materials of mini-laboratories, to supplement the necessary schemes. Set the goal of preparing children who are capable of creative solutions to problems and tasks; capable of bold statements, assumptions, and the search for ways to resolve the situation.

An experiment in a kindergarten allows you to familiarize children with specific research methods, with different measurement methods, with safety rules during an experiment. Children initially with the help of adults, and then independently go beyond the knowledge and skills received and specially organized activities, and create a new product - a building, a fairy tale, full of smells of air, etc. Therefore, the experiment relates the creative manifestations with the aesthetic development of the child. Particularly intellectually active, emotional attitude towards the environment, cultivated by the teacher, manifests itself in the desire to express in the process of experimentation individually their experiences and ideas about the objects and phenomena of the world. 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 value relation to the real world.

Our children are active figures. We think that this will help them on the threshold of schooling.

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