MATH, NATURAL SCIENCE AND ICT AT KINDERGARTEN

PhD Snezana Jovanova-Mitkovska

University "Goce Delcev" Stip

Faculty of education

Abstract

Future, welfare of our society, depends on investment in human potential. This investment starts from the smallest child age and lasts until the end of human life. What will be built as intuitive knowledge in early preschool age is a database which is constantly upgraded and expanded. Therefore, it is necessary for each child to be enabled with the best possible start. It is provided at the family, at preschool institution, schools etc. Preschool institution should offer a multitude of diverse opportunities for learning, gaining experience that will lead to meeting the interests and needs of a young child. Young children are naturally curious, always looking for answers about the world around them. Therefore, this natural endowment should be used for understanding the world. By observing and exploring the world using all their senses, with guidance from a teacher, and through direct interaction with his friends, it allows connection to their intuitive knowledge and experience, its placement in a new context, and thus contribute to their development. By promoting the integrated learning, to enable children to explore, experiment with different materials, known to them from everyday life.

The kindergarten programs should be designed in such a way, to help children based on their previous knowledge and experiences, form concepts, to acquire basic skills, and positive attitudes towards learning, lifelong learning. The base includes the knowledge, skills from math, science, language, knowledge of ICT...

Therefore, in this paper we tried to answer some key questions through the application of descriptive method, interviews, participatory observation in some kindergartens in Macedonia, we came to answer the following questions: How children learn mathematics?, How do they learn science? How to apply ICT in kindergarten? What strategies should be used by educators to achieve the effective development and learning from these areas in preschool children?

Key words: mathematic, natural sciences, ICT, strategies, integrated learning

An integral part of the overall educational system, which evolved long ago, is an organized system of preschool education. It occurs as a consequence of accelerated socio-economic development, the development of industrialization, urbanization, and consequently of including women, who have a role of family educator of her children, participant in organized

social life and production, in addition to family education, in sense of a planned, systematic and organized act on the physical and psychological development of each individual, to create equal conditions for optimal development of all children from preschool age.

Through their curiosity, exploring spirit, activity, children quickly exhaust the possibilities and what the family environment offers. Despite the overwhelming desire of parents to extend children's experience, despite their efforts, they may not meet the needs and interests of the child's intellectual upgrading, their work has sufficient breadth, it is not organized, doesn't take place systematically, does not provide completeness.

The shortcomings of the family offering are complemented through organized preschool educational system. Early access in preschool education leaves its mark on the whole further education of each individual, its building in positive, creative and active person who will have faith in oneself, respect oneself and others around it, because at that time the child has opportunities for maximum development of intellectual abilities, coming into contact with the phenomena and events in the immediate environment, that influences on the development of curiosity, interest in gaining the basic notions and concepts, enriching the experience and knowledge, the establishment of basic cultural and hygienic habits, and to set the basic for child socialization. In that direction, preschool education has great importance and role in forming the basis and foundation on which representations, concepts, knowledge, skills and habits are upgraded, as well as the development of child creative abilities. To be able to act successfully in this period, it is necessary to know the characteristics of child development (period during which the intelligence and perceptual abilities are largely developed, period in which the child has an excellent memory and intense sensory and present development, period in which differentiation of motives and emotions are present, in which they develop interests and internal motivation for the objects of interest and interactions with peers..), to know how preschool child thinks, learns, how they acquired knowledge, on which way and so on, to understand the factors of psychological development and psychological bases for introducing children into the world of natural and social sciences.(Jovanova, 2008, p. 42-50)

How children from preschool age learn?

It is known that children of preschool age are too impatient, curious, and noisy, want to ask, explore, be tireless, show interest in everything, wanting to play, socialize. Children from young age think that learning is an enjoyable experience, "I learn I want to learn" in which freely,

without fear and discomfort, they surrender. Because of that we should always bear in mind that every child in kindergarten comes with different capacity of knowledge, developed abilities, skills. Preschool children learn best through activities that resemble of real life situations - facilitating the transition from concrete to abstract notions and concepts, inquiry, research, experimentation ... Hence, the game, on which children freely indulge and in which they perform various activities, imitation, comfort, gain knowledge.., learn, upgrade their previous intuitive experience, is one of the forms of teaching pre-school child. No less importance has targeted and leisure activities that are implemented in the preschool institution and that allow children to learn from the smallest feet. Therefore, in kindergarten, with intention to meet the developmental needs of each child, we should create conditions for learning, self-expression, development in different areas. (Jovanova, 2008, p.51-52)

What is the content of environment for learning at the kindergarten?

Environment for learning should be designed to meet the needs of children learning to allow the maximum development of their potentials. It should be sufficiently large, with opportunities to have more open corners, centers of learning, well equipped with the necessary didactic material, where the child depending on his interests will be directed, where it will learn, demonstrate the knowledge, skills, will manage time, develop its potentials, of course directed, taught by teachers.

Learning environment should be supportive, able to engage all children's sensory capabilities, opportunities for play, experimentation, research, monitoring, problem solving, to enable social interaction, enabling children to relate past experience with the new experience, agreeable with the opportunities of children from a developmental period. Learning environment can support and encourage positive attitudes, assumptions to promote critical thinking, enhancing children's abilities, to assist the child in building connections with their previous knowledge and the world around them. In this regard, the role of educators in the planning of activities performed by them is huge, encouraging the children, their guidance, helping, interaction, collaboration. At the kindergarten, in accordance with the programs for realization of educational activities, children’s acquire knowledge, learn from different areas. Greater role and importance for the future development of the preschool child is math, science, the application of information technology. (National Research Council, 2000). Therefore we set a few questions like:

How preschool child learn math?

Child learns math better through activities that allow him to: explain; think about what is explained; solve problems using information and data which acquires independently; explains how it came to solve the task independently.

Children learn math easier when establishing contact between what is provided for learning, set rules about it, and with their own previous experience. With the use of tasks that include household items (such as measuring cups of liquid, handling in the kitchen or observation of everyday events (weather through the week)), they can see that mathematical ideas are all around them.

A very important part of learning math is learning how to solve problems. In this sense, the children are imposed with problem situations that stimulate their curiosity and exploring spirit, affect research use, apply learning through trial and error, developed their reasoning ability and learn how to go further in solving problems. They learn that there may be more than one way in problem solving and more than one answer. Also, they learn how to express clearly when explaining their solutions. Developing a positive attitude towards mathematics and confidence in self efficiency are key components of children's learning and future achievement in this area.

How to introduce preschool children to the world of science?

Children from their early age are curious about what is around them, about what happens around them. Frequently asked questions and sometimes according development period through which pass, they give appropriate answers: Why it rains? Because I cried yesterday. Why does lightning occur? What is the water, what is it made of? Etc.

This natural curiosity of the child should meet through organized activities at preschool institution. The child should be allowed to explore, examine, experiment, find answers to posed numerous problems and issues, of course, directed, and encouraged to search for new alternatives, encouraged by the teacher. Teacher should be the one who will model research, will encourage research, but will use children's questions about modeling it. What will happen if...? Why the color of water is such etc? What answer to accept? Teacher must assess what and how children can learn through the game - to observe, simulate situations, to solve problems, think critically... When introducing the child into the world of science, application of integrative, interactive learning in which and through which children can develop different concepts from different areas has huge role: math, language, nature ....., through which children will be enabled to establish connection between knowledge from different areas.

The application of diverse and extensive didactic material and the change of activities by the teacher can facilitate the introduction of children into the world of science. (The Kindergarten Program, 1998)

The role of IT technology in preschool institution

Bearing in mind that ICT penetrated into all spheres of human life, it is also present in the kindergarten, so we need to apply it in preschool institution. It can be applied as a tool for implementation of specific educational content from a variety of educational areas. Visualization which it offers, sound, numerous designs of certain problems, opportunities to create, graphic display, and presentation and so on, can encourage children's interest, to direct, to enrich their knowledge. Teacher is the one that would dosage contents and planned activities that will use ICT, corresponding software programs that will incorporate in the educational process. (Discussion paper for ICT, 2001)

When we introduce children into the world of mathematics, science, we should always bear in mind that the child is not a passive recipient of information, but it grouped them, processed, parted, generalized, an entirely new ones. By applying the chosen strategies, child should be trained how to access to certain types of problems. In this context of great importance, is to set up the child a series of possibilities such as; setting the problem situations, problem-setting tasks, set in the situation for independently finding a solution to the task, direction, collaboration with others, unless it can be resolved, identifying instances in the middle; simulating situations; independently sets tasks and searching for solutions, to draw; reveals, sets model, construct, build, measure, work with data, ... Recipient (the child) is directed to perceiving the wholeness of the world around him and asking from him completely, not partially knowledge.

But what happens in practice? In that order, we realized a little research into children's institutions in the municipality of Stip. The purpose of this research was to examine how children are introduced into the world of science, mathematics, is ICT applied in kindergarten, and which strategies are applied by educators to achieve the effective development and learning from these areas in children of preschool age.

We set the hypothesis that in kindergarten educators apply a small number of strategies aimed on achieving effective development and learning in children of preschool age. We applied analytic- descriptive, and descriptive-explicative method. Particular attention is addressed to the

description and analysis of space requirements, weather, atmosphere, quality of relationships, forms, work-games tools, used didactical approaches and the impact which the teacher has.

Observation technique - participatory observation were used to monitor the educational process, strategies that apply educators, children in all work stages, methods, means and forms of work which are applied in the process of acquiring images, notions, their independence in performing certain operations, activities, frequency of feedback on cognitive process. We received two sets of data: a global description - describe working conditions in kindergarten (room space, entities, activities, events, time, emotions) and focused description - followed and describe micro strategic elements arising from the application of different strategies of educational work (strategies that applied teacher, methods, forms of work, feedback to children, interest, motivation, relations, communication in an educational group ..).

Subjects observed were children from two educational groups (medium and large) in the garden “Flowers” in Stip. The role of the observer - participant had the researcher. For greater accuracy, technical equipment was used for recording situations, dialogues and other activities.

Interviewing technique was used to identify the strategies applied by educators in the planning phase, implementation and evaluation in various educational areas. The sample for interviewing was deliberate and was interviewed six: three teachers responsible for the middle group, and three responsible for major groups.

The realized participatory monitoring of education activities in educational groups, and the conducted interviews with educators led us to more complete information about various aspects of the problem in this research. Discussion of these findings will guide us through the next few categories:

1. *Conditions for development of educational - there are necessary conditions for development of educational work*. The position of space, in the sense of view of a natural beauty, offers new design different depending on the needs and matter that is taught and learned. There is a wealth of teaching material, computer, which from the words of the educator is result of joint efforts of the principal, educators, parents and donors. Wealth of toys, mathematical semaphore logic boards, magnetic board, color rings are aimed at increasing perception.
2. *Strategies applied by educators in the implementation of content aimed at the formation of scientific knowledge, achieving efficient development*. What is common and

characteristic in terms of strategies is the application of demonstrative, descriptive and explanatory strategy, and strategy experience and expression of lived- and teach-learn strategy. The application of these strategies are emerging as a necessity because it is typical, that child of this age is at the concrete inductive approach in overcoming the math content, science, respect the principle of perception, and the need for greater activity and the role of educator, rather than teach strategy. Experience and expression of the lived through is the same way characteristic of children of this age who accepted and entered into all content with more emotion. Greater role of the teacher, who should be master of his craft, who will allow children an active approach, gradually entering into the world of entertainment and interesting math and science. Dominant activities that are realized from these content areas are mandatory activities and game.

3. *How child learns, experiences and adopts terms?* By creating the environment for learning the teacher through planned and realized activities allows the child to count, compare, and measure, analyze, synthesize, classify, explain, solve problem tasks. Heuristically approach allows the child to trace, use multiple sources to discover, collaborate, ask questions, and come to new self-knowledge...
4. *Communication and interpersonal relations of subjective factors in educational work* - we also create conditions that allow opportunities to the child as an individual to comes into direct contact consistently and relationships with their classmates, teachers

CONCLUSION

The analysis of the theoretical discussions of this problem and the empirical data that came in research using the techniques: interviews and participatory observation, direct contacts with the participants in the research, carried out the following data:

1. Earlier questions, posed in the introduction, during the research, found their answer in both theoretical arguments and at the data of realized research.
2. The conclusion from this research should not be accepted as categorical, because they relate to a specific sample at certain time duration. However, they still need to honor in order to improve, enrich the strategies applied in educational work with preschool children.

3. The kindergartens have necessary conditions for realization of educational work on math, science with children of preschool age, both in terms of interior stylization and in terms of equipment with perceptive didactic material.
4. Program for educational work with children from preschool age, reflect contemporary trends in conception and realization of education for this age, it is in accordance with the children needs and opportunities, program content and requirements are actually measured, directed toward the activation of the child thought, bridging the adoption of ready knowledge to the process of acquiring knowledge, the teacher is encouraged to seek and finds a variety of strategies in the implementation of content for acquiring new knowledge, skills, abilities.
5. There are clearly identified strategies that educators apply in the conditions of application of different models of planning (team-thematic planning), implementation (descriptive, explanatory, demonstrative, a strategy of learning and teaching strategy of experiencing and expressing experienced, strategy for detecting, strategy of cooperative learning, group discussion strategy) and evaluation of the effects of work (permanent, continuous monitoring of the adoption of a processional in the terminology of any particular development of each student).
6. The application of various methods of educational work (demonstration, illustration, text method, ..) and various forms of educational work (front, group, individual) positively affect the child's independent work, his interest and motivation to work and the possibility of better communication and continuous feed back.
7. The choice of different strategies for educational work is a requirement for technical support of the educational process.

References:

Јованова, С. (2008). Развојни стратегии и модел на работа во почетно математичко образование. Необјавен докторски труд, Скопје: Универзитет Кирил и Методиј

National Research Council. (2000). *How People Learn: Brain, Mind, Experience, and School*. Washington, DC: National Academic Press.

The Kindergarten *Program*. (1998) Beginning in September *2006*, Taken on 20.05.2011 од *www.edu.gov.on.ca/eng/curriculum/elementary/**kindercurrb**.pdf*

Information and Communication Technologies, **Discussion paper,** Taken on **22.05.2011 од** *www.**earlyyears**.sa.edu.au/files/links/**ICT**_in_the_EYDiscussion_Pa.pdf*