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THE ROLE OF THE EXPERIMENTAL AND RESEARCH ACTIVITY IN THE PRIMARY SCHOOL DURING THE CLASSES OF "MAN AND NATURE"

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Abstract: Intense changes in public life create new requirements for the preparation of the growing generation. This implies that education is person- oriented and flexible so as to help develop personality and solve social, cultural and economic problems. "Man and Nature" is a school subject with great developmental potential, through which adolescents have the opportunity to form cognitive interests and research skills, a scientific worldview, to create conditions for personal self-awareness and self-development. The cognitive contents of "Man and Nature" and the resulting emotional saturation of the learning process create prerequisites for the students to perform experimental research, as a result of which they have the opportunity to get acquainted with the world around them and to influence specific subjects, processes or phenomena from it, to point out the existing laws in nature, to highlight causality relations and dependencies between the phenomena in nature, to follow the changes that occur in the environment as a result of a number of factors. Through the peculiarities of the natural and social environment, the subject "Man and Nature" reveals both spiritual and practical life, allowing students to penetrate the nature of the surrounding world and understand the regularities of the phenomena under consideration. Practical work, as the basis of science education in the primary school, provides some of the most beneficial opportunities for childhood curiosity. However, the students' experimental and research activity implies not only physical activity but also mental activity on their part - development of observability, problem-solving, diagnosis of contradictions, gathering and analyzing information, constructing ideas and formulating definitions of concepts, raising hypotheses, making and implementing decisions, proving, formulating summaries and conclusions. In this way, teachers have a wide range of educational and development goals, taking into account the need for knowledge of nature and ecology. It should be borne in mind that the age of the students does not allow the use of the problem-research approach in its typical form. However, this does not prevent the possibility of planning both entertaining and difficult learning activities. It is this emotional situation that activates and adjusts pupils to cognitive activity and responds most fully to the psychological characteristics of the childhood personality during primary school age. Achieving beneficial learning outcomes ensures that the knowledge of non-living and living nature is expanded and reinforced, expanding the child's horizons, waking up the child's interests, developing a research spirit, educating nature-friendly behaviour.
Keywords: Experimental Research, Primary School, "Man and Nature"

Self-dependence is a key competence that modern school pursues. Modern children soon develop important competences and skills that reflect their behavior and relationships with people, both from their immediate surroundings and from the more distant.

According to D. Holt[35] (2010), it is important to understand the ways, the conditions and the atmosphere in which the children learn best and the school should become a place where they use and develop their inherent way of thinking and learning. In this way, children will grow "not only in growth, not in knowledge, but in curiosity, courage, confidence, independence, ingenuity, toughness, patience, skill and understanding."

Research (experimental) work is a typical method in learning the natural science knowledge and is a major component in stimulating active learning[36]. It is a challenge for both small and large. Its realization needs to be supported in a number of principles as follows: the principle of naturalness (with a real problem and present interest), the principle of awareness (of the problem, goals, tasks, course of research and its results), the principle of amateur activity of the study to be mastered by one's own experience), the principle of visuality (best done in a field study, where the student studies the world not in the knowledge of books but in action), the principle of culture (to

[35] Холт, Д. (2010). *Как децата учат*, 2010.

[36] Терзийска, П. *Обучението по Роден край и знания за природата и обществото. Актуални проблеми*, Благоевград: ИК „Интелект-А", 1999, с. 89.

take into account the tradition of understanding the world in the given culture, as well as the interactions that exist in a social community)[37].

Children learn about themselves, both about their mental and physical abilities. V. Gritsenko and colleagues[38] emphasize the need for training in learning from the first grades, as methodological problems are observed in the process of work with learners. The participation of pupils in scientific school activity has several purposes: first, self-assertion; second, expression of potential abilities; third, proper understanding and formulation of research tasks and methods, proper presentation of the results of their own work, presentation of the essential accents from their own work for definitely regulated time.

The school subject "Man and nature" is integrated, scientifically oriented and environmentally friendly, and because of these characteristics, it is the most suitable for the simultaneous formation of research skills and knowledge of the natural environment, i.e. satisfying the students' need for environmental knowledge and skills to orient themselves in it. School activities in "Man and Nature" imply some specificities and differences from other subjects, because in them, along with the teacher, the very nature very often interacts with children as well. Thus the experience of the students is the source of their knowledge. The acquired knowledge and research skills resulting from the training on this subject matter have a profound personal meaning and are closely related to the practical work of both the primary school pupil and of his education and development in the future.

The lesson is a basic organizational form of learning, and, as any other lesson, the lesson in "Man and Nature" must be adapted to the child's favorite activities - play, fun, discoveries. According to N. Mihaylov[39], the effectiveness of training in "Man and Nature" is directly dependent not only on the quantity and quality of the acquired knowledge and skills, but on the attitude of the student towards the learning activity. This also applies in particular to the students' experimental research, for which the forecasts are more than favorable because of the students' initial need for new impressions and knowledge. N. Mihaylov[40] points out as a significant problem that for obvious reasons, the pupil in the primary school age, having crossed the threshold of school, takes the position of a child, and the teacher - the position of a capable adult knowing (suppressively?) everything. The author explains that preserving this position during the student's stay in the education system does not guarantee that at the school leaving the pupil is a psychological and socially mature person. We believe that this asymmetry should be interrupted in the educational process in the primary school and that this process should focus on the developing the pupils' subjectivity and the qualities that enable them to manage their own development and interactions with the surrounding world. Another problem is that time and activities devoted to experimental research are insignificant compared to fact-finding.

As far as the content is concerned, through the experimental research in "Man and Nature", primary school pupils have the opportunity to master knowledge of living nature - primarily for plants, both to master knowledge and non-living nature – such as the physical properties of air and water, the aggregate states and the circle of water, air movement; light, heat and moisture as plant growth conditions and others; to verify the practical significance of the biological knowledge acquired for the cultivation of plants and animals, the soil types and soil fertility conservation, the country's mineral resources, their importance and the need for their rational use, to convince them of the importance of the physical and chemical properties of air and the water for the life of the planet and the economic activity of the people. The diverse and natural materials (clay, sand, water, snow, etc.) they love to play with affirm nature as an important tool for their upbringing and education. In this way, the children directly perceive through the senses different properties of the natural objects - shape, size, sounds, colors, spatial position,

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[39] Михайлов, Н. *Познавателният интерес в обучението по Роден край, Околен свят и Човекът и природата*, София, 2006, с. 28.

[40] Михайлов, Н. *Концептуално-дейностен модел на обучението по Роден край и Околен свят (I-II клас).* Дисертация за присъждане на образователна и научна степен „доктор" по научната специалност Методика на обучението по родинознание и природознание, Благоевград, 2003, с. 134.

movement, qualities, noticing their change and development. A sustained interest in the studied subject and an increased activity towards the accompanying observations and experiments are formed.

In what conditions can the foundations and development of experimental research be developed in children? First of all, for the success of this activity, we consider the conditions of perseverance, motivation and psychological comfort to be important. The research spirit is set in every child and this facilitates the teacher in the motivational provision and organization of the educational process in "Man and Nature". The adolescents are naturally inquisitive, they explore the world around them and this favors the activity of forming the research skills in them. At primary school age, their curiosity and satisfaction with success in learning, overcoming difficulties and achieving desired goals, unfold and intensify. Moreover, we believe that by shaping their research skills, pupils have not only cognitive but also social motives, because the environmental awareness of the research environment has a social context. In other words, students have a desire to explore the different phenomena and objects from the natural reality, as well as the need for recognition in school and in the family, for reaching certain relationships with parents, teachers and other important personalities.Their research behavior helps to adapt them to the environment, to form their literacy. For this reason, children's curiosity should be provoked and allow children to get to know the satisfaction and enjoyment of observations and experiments. We consider this to be a mandatory task, having in mind the generally established desire of the children to study plants, animals, relief and climate as essential elements of the natural environment, as well as their own activity to acquire new knowledge during experiments in subject study and phenomena. The necessity of the latter is due to the peculiarities of cognitive processes.

Secondly, when organizing research, it is necessary to take into account the psychological and physiological characteristics of the children's primary school age. What is characteristic of it is that the rate of voluntary observation over involuntary increases. Perceptions are more complete and lasting than those in pre-school age, and the perceived ability to perceive gradually becomes observable. Attention extends its scope and becomes more organized, disciplined and meaningful. At the same time, it is important for the development of the child's personality to provide opportunities for more autonomous thinking, for discovering clear and understandable problems, rules and regularities. Students' thinking is also related to practical actions and speech, and for this reason it is determined by their experience. At this age, the mechanical memory is predominant and the most productive is the memory of the visual material. It is best to develop the motor memory, which is the basis for skills and habits. Primary school pupils mainly operate with specific images because of the limited experience they have. But by conducting research activity, students begin to gain experience by:

- acquiring knowledge and skills for describing, identifying and grouping materials, substances, organisms, natural phenomena and processes;
- gradually mastering terminology;
- developing skills for teamwork, dialogue and discussion;
- developing skills to use information and other additional resources, analytical skills and information synthesis;
- using patterns and graphics for processes and phenomena of living and non-living nature;
- carrying out observations and experiments;
- carrying out practical work with appliances, apparatuses, substances, mixtures;
- establishing and analyzing internal relations between processes in nature;
- acquiring knowledge that enables them to understand the scientific foundations of different types of people's work activities (soil treatment, fertilization, weeding, etc.);
- applying the acquired laws in solving practical tasks;
- using a research approach to solving life problems;
- building their ecological value system;
- activating civic consciousness and initiative.

Thus children realize the effect of their actions on nature, in other words, they are interested in "Who am I in this world?" and "How do my actions affect the environment?" They also improve their motor culture, strengthen their health, develop their psyche, their interests and curiosity, they are educated in the proper behavior in nature. The teacher's role is to encourage children in their own power and to incite them to knowledge with the help of engaging and diverse activities, stimulating their natural aspirations to explore the surrounding world. We consider it the teacher's responsibility to free his students from their fears of making mistakes, bothering or disappointing their classmates, teachers, or parents.

Summarized, the conditions described above can be presented in a more complex way and as the following determinants, with emphasis on modern developments:

- existence of a research and creative environment;
- existence of subject-subject relationship between student and teacher in the process of the research activity;
- development of creative activity in the freedom of choice of the topic of the research;
- valuable attitude towards the research activity and its results.

We think that we can add one more determinant to them, namely to stimulate the initial interest and the necessity of conducting experimental research. This determinant, as well as the last of the ones listed below, could effectively be secured when going on an excursion. It is an important form of organization of the learning process. During the excursion, children learn about their surroundings, get knowledge about plants, animals, they are given the opportunity to observe them, ask questions about issues that concern them. They develop their skills to observe, to develop their speech, to discover and notice the beauty in nature, moral qualities are formed in them.

In this line of thought, on the one hand, account is taken of the diversity and variety of the curriculum of "Man and Nature" and, on the other hand, the public needs and requirements for entrepreneurship and initiative, which the development of society puts before its members.

In the course of implementing the research tasks one or several stages of experimental research are supposed to be carried out: analysis of the source information; formulation and awareness of contradiction; raising a hypothesis; setting an experiment; theoretical justification; conducting the experiment; processing of the results; formulation of conclusions; summary and application of new knowledge.

E. Yanakieva[41] notes that "not all behaviours that bear the outer signs of child experimentation can really be characterized as such." There may be an "event that causes the child to look for causal links, but we do not have the elements of experimentation: purpose, guess, checking the assumption, result". According to her[42] "the experimentation is directed at the development of the student's own research activity (" Make and Know "). It allows them to master the algorithm of cognitive activity: setting a goal ("I want to know ..."), speculation ("Perhaps ..."), defining the way to achieve the goal and checking the assumption ("And what happens when ... "), analyzing the results obtained and drawing conclusions". However, experimentation should not become a "dictatorial experiment", as E. Yanakieva[43] states, "it quickly loses the charm for the child and they important opportunities for its development will be missed."

We believe that experimentation in the lessons of "Man and Nature" should be done in natural or laboratory conditions, and when passing through its individual stages, the students learn to set research goals, develop hypotheses, formulate and carry out research tasks, whose results they should summarize and implement. This means that pupils should be placed in a situation where the development of learning is based on personal experience, the resolution of contradictions (certain difficulties in the learning process, characterized by a lack of definite explanation of certain facts and phenomena or ambiguity and hesitation in choosing a true solution, with the need to be clarified), the learning of knowledge on the path of mastering research behavior and the development of independent experimental research. K. Marulevska[44] explains that "in the early classes, the foundations of the future conscious cognitive activity of the pupils are laid, which is necessary for the building of autonomy, the pursuit of self-development, self-expression, the realization of one's own and other people's uniqueness."

In conclusion, the pupil's experimental and research activity is precisely this activity that motivates them, introduces them imperceptibly into the depths of science and produces applied attitude and behaviour towards the environment (a research approach and a research behaviour). The latter is usually combined with uncertainty, doubt, hesitation, fear, worry. We believe that the foundations of pupils' personal development in the primary school presuppose and require the creation and validation of sustainable cognitive interests and constant cognitive activity of students in their growth and personal development. All this outlines the importance of purposeful work on the

[41] Янакиева, Е. *Аз съм потокът, а ти – реката, в която се вливам: За екологическото образование на децата от предучилищна възраст*, Бургас: ДИМАНТ, 2001, с. 206.

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formation and development of students' research skills for their successful cognitive and personal development and realization as adults.

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