

## **ESTABLISHING EXPLORING SKILLS IN 9-10-YEAR-OLD PUPILS IN THE PROCESS OF STUDYING OF NATURE**

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### **Abstract**

*This article studies the significance of students' exploration activity and position nowadays and their share in the personal intellectual-creative potential. It outlines the psychological conditions for the optimum perception in training and the prerequisites for the active studying through trial and experience in dealings with nature as an inexhaustible source of children's observations and experiments. The focus is put on the priority of inter-subject relationships in creating the general picture of nature. The particular educational borderlines of exploration behaviour are outlined.*

**Key words:** *explorer's skills, exploring activity, nature, experiment, observation, “Man and Nature”*

Nowadays, more than ever before, exploring activity is considered a personal quality of particular value and significance. Along with the social and educational factors, the environment factors also determine the establishment and development of the child's personality. Their advantage is based on their accessibility, closeness to children's age and high level of emotionality upon their influence. The profound knowledge of surrounding nature is related to durable interest to it, and dealing with it contributes to the healthful growing of children, both physically and mentally.

Since the earliest childhood a child encounters an all the time changing world, which has a huge influence on the child's development. The child learns knowledge, skills and habits of dealing with nature. At pre-school age the child has begun developing an attitude towards it and finding its place in environment. A purposeful work for cultivation of a cognitive interest and establishment of exploring skills is started as the person needs to have an explorer's experience in order to be competitive in the situation of modern inventions, technologies and strategies. In other words we need to acquire the competences required for the successful personal and professional life. When children start school they have entered in a period of enhanced receptivity to particular aspects of surrounding environment. In the course of primary education the interaction between nature and children is implemented mainly during the classes in the school subjects of the Natural History cycle. In its role of a mediator the classes of “Roden kray” (Local history and geography) are continuation of the lessons of pre-school age, and together with the school subject of “Okolen svyat” (Natural environment) during the 2<sup>nd</sup> form support the pupils in their orientation and thorough acquaintance with the natural environment. The school subject of “Man and Nature” studied in the 3<sup>rd</sup> and 4<sup>th</sup> forms extends and raises to a higher level pupils' knowledge of nature learnt during the 1<sup>st</sup> and 2<sup>nd</sup> forms. Children gradually pass from beginner's perception to analysis of natural sites and phenomena, of their properties, with clearer understanding of the motive powers and causalities, their willingness to explore and search explanation of the occurrence of certain natural phenomena increases. Based on their own experience gained as a result from the contact with natural phenomena, the pupils can get to the heart of relationships and dependencies in nature. The acquaintance with nature plays a significant part in the children's development. The remarkable pedagogue Sukhomlynsky emphasizes the influence of nature on the child's cognitive development, and according to his opinion nature is at the root of child's thinking, emotions and creativity.

Experiences close to nature stimulate the child's interest for natural environment and such a communication establishes prerequisites for active learning through trial and experience, i.e. learning through direct activity with the object. This conception is reviewed and detailed by Vasileva (2007,

p.180-181), and namely: learning as experience, with a particular sense for each child and respect for his/her individual differences; with options of creative manifestation and enhanced attention to his/her development, with recognition of his/her unique contribution to collective work. In the same work the author states that this type of learning is implemented independently through experience, extends work in collaboration, stimulates self-realization and allows freedom of choice and manifestation of each student. In our opinion all these establish an interactive environment where every student has an opportunity of manifestation. According to Mircheva (1997, p. 95) action-orientated education is directly related to the principle of activity. Such an education and the said principle take a creative part in the exploration work of students as education is action oriented. In addition it should be supplemented and emphasized that in the implementation of their exploring activity the 9-10-year-old pupils apply practically their knowledge learnt from their studies of the school subject of "Man and Nature". The educational contents of this subject contributes to that end, as well as the major ideas advanced at studies of nature supported by actual examples upon contacts with it and by continued long-lasting experiments – that all the things are mutually connected and interdependent, there is a cause for the occurrence of every phenomenon, everything changes all the time. Some of the ideas proposed by Kabasanova and Naydenova (1989, p. 40-45) are: nature is developing and changing all the time, inanimate and animate nature exist in unity, idea of causality of phenomena in nature, idea of environment protection and restoration, all the time changing and development of organisms, unity and variety of animate nature, similarity of major vital processes in plants, animals and humans, biological balance in nature, place and role of man in nature, relationship between theory and practice.

In order to implement the practical application of knowledge during the elementary stage of education the teacher uses not only verbal methods (talk and discussion), but also scientific-research ones (observation and experiment), practical (planting, cares related to growth and development of plants and animals) and play-involving ones. During the curricular activities in the school subject of "Man and Nature" pupils have the opportunity to check the practical significance of the learnt biological knowledge of plant and animal growing, types of soil and preservation of soil fertility, ores and minerals of the country, their significance and need for their rational utilization, to convince themselves in the significance of physical and chemical properties of air and water for life on the planet and peoples' economic activities. The varied and natural materials (clay, sand, water, snow, etc.), they love to play with, strengthen further the position of nature as an important means of their education and training. This way children directly, through their senses, perceive various properties of natural objects – shape, size, sounds, colours, spatial position, movement, qualities, and note their change and development. With regard to this cognitive activity pupils demonstrate intellectual emotions related to it.

In the process of work they use also imagination, creativity, patience, and develop keenness of observation, quickness of mind, steadiness of attention, creative fantasy and active thinking. The variety of natural objects enables the teacher to organize interesting and useful activities for children. In the process of learning of knowledge of nature and establishment of elementary notions of objects children collect natural materials needed in their practical classes. Dealing with them is among the activities through which the touch with nature is implemented. Children prepare herbarium flowers, leaves, stems, straws, pictures, models, appliques of various natural materials. This way they also learn how to work aesthetically. It is important to teach them of the aesthetic properties of natural phenomena as their attitude to nature depends to a large extent on their ability to perceive nature aesthetically. In parallel with the establishment of exploring skills in children during the educational process in the school subject of "Man and Nature" the pedagogue should habituate pupils to love for nature and work. Training and exploration activities in the classes of "Man and Nature" are related to the work of pupils close to nature, in the course of which children collect factual material and find that the life of organisms is adapted to their natural environment. In every class close to nature attention should be paid to aesthetical and labour education, as well as ecological and patriotic education. This comes in support of the position that the child's exploring activity close to nature influences positively the development of his/her personality. The variant of easiest access and greatest ease as an active process of teaching and application of knowledge is the care of plants and animals, of their feeding, heating, habitat, together with the responsibility of their life and existence. Being a type of intellectual-

creative activity it supports, and even enhances pupils' motivation and readiness to study. It performs several functions that are frequently mentioned in works related to it, and namely:

- cognitive (revealing the knowledge of surrounding environment);
- educative (establishing attitude towards the creative process of learning);
- guiding (determining the direction of pupils' behaviour);
- individualizing (revealing the personal significance of activity);
- developing (having a reflection on the style of thinking).

What are the conditions for putting the foundations and development of exploring activities in children? In the first place we consider the conditions of perseverance, motivation and psychological comfort significant for the successful conduct of this activity. There is an explorer's spirit in each child and this assists the teachers in motivation support and organization of the educational process of the school subject of "Man and Nature". Pupils are naturally curious, keen to explore the surrounding world and this is conducive to the work for establishment of exploring skills in them. At the elementary school age their curiosity and satisfaction with success at school, with overcoming the difficulties and with the achievement of desired goals are developed and activated. Furthermore, we reckon that in forming their exploring skills pupils have not only cognitive, but social motives, too, as the exploring behaviour in studies of natural environment has a social context, too. In other words pupils are willing to study the various phenomena and objects of natural environment, and experience a need for recognition at school and within the family, for attainment of certain relationships with parents, teachers and other persons of importance for them. Their exploring behaviour contributes to their adaptation to natural environment, to the establishment of their literacy. For that reason the children's curiosity should be provoked and children should be given an opportunity to come to know the satisfaction with and pleasure of observations and experiments. We believe it is a compulsory task taking into consideration the established in principle willingness of children to study plants, animals, relief and climate as basic elements of natural environment, as well as their own activity aimed at learning new knowledge in the course of experimenting when studying objects and phenomena. The need for that is established due to the peculiarities of the cognitive processes. In the second place, in the organization of exploring activity the psychological and physiological peculiarities of the elementary school age of children should be taken into account. A typical feature of it is that the share of conscious observation starts exceeding the share of unconscious one. Perceptions are fuller and more durable as compared to those in the pre-school age and the skill to perceive gradually becomes keenness of observation. Attention extends its range and becomes more organized, disciplined and rationalized. Next, for the development of child's personality it is important to provide opportunities for more independent performance of mental operations, for discovering clear and understandable for that age issues, rules and regularities. Pupils' thinking is related to practical actions, too, and to speech, and for that reason it is determined by their experience. At that age mechanical memory prevails, and the memorization of visual material is most productive. Motive memory is best developed and it is the basis for the establishment of skills and habits. Pupils at elementary school age operate mainly with tangible images due to the limitations of experience they have. But when implementing exploration activities pupils start gaining experience by:

- acquiring knowledge of and skills in describing, distinguishing and grouping materials, substances, organisms, natural phenomena and processes;
- gradually learning terminology;
- developing team-working skills and skills to carry on dialogues and discussions;
- developing skills to use information and other extra sources, skills for analysis and synthesis of information;
- using schemes and diagrams of processes and phenomena of animate and inanimate nature;
- performing observations and trials;

- conducting practical work with tools, apparatuses, substances, mixtures;
- finding and analyzing interconnections between processes in nature;
- acquiring knowledge that enables them rationalize the scientific basics of various types of labour activities of people (soil cultivation, fertilization, weeding out, etc.);
- applying the regularities learnt in solving practical problems;
- using explorer's approach in solving problems of life;
- developing their own ecological value system;
- activating their civil awareness and initiative.

This way children realize the effect of their deeds on nature, in other words they become interested in „Who am I in this world?“ and „What is the effect of my actions on environment?“ They also improve their physical culture, strengthen their health, develop their mentality, interests and curiosity, and cultivate proper behaviour close to nature. The teacher's role is to reassure children in their own strength, and to encourage them to learn knowledge with the help of fascinating and varied activities stimulating their natural aspiration for acquaintance with the surrounding environment. We reckon it is the teacher's responsibility to set the children free of their fears of making a mistake, of hurting or disappointing their classmates, teachers or parents.

As a generalization the conditions described above can be presented in a more complex manner as the following determinants that are being emphasized by the contemporary works:

- presence of research-creative environment;
- presence of subject-subject relationship between the pupil and the teacher in the process of studying and exploration activity;
- Development of creative activity with the freedom to choose a topic of exploration;
- Worthy attitude to exploration activity and its results.

In our opinion there is one more determinant to be added, and namely – stimulation of a beginner interest and need for performance of an exploring activity. This determinant, as well as the last one in the list above could be achieved as a result from the organization of an excursion. It is an important form of organization of the educational process. In the course of an excursion children get acquainted with the surrounding environment, acquire knowledge of plants, animals, and gain the opportunity to observe, to ask questions on issues that made them excited. They develop skills of observation, improve their vocabulary, start to appreciate and discover the beauty of nature, and develop ethical qualities. However, the lesson taught in class remains the basic organizational form of education, and as valid for all the classes, the one of “Man and Nature” should be adjusted to children's favourable activities –game, fun, and discovery. This school subject is integrated, scientifically oriented and environment-friendly, and due to the said characteristics of its, it is the most appropriate for the concurrent establishment of exploring skills and acquaintance with natural environment, i.e. it satisfies the pupils' need for knowledge of natural environment and skills for orientation in it. All these bear an environmental charge due to which the educational process gains further significance. Notwithstanding the „persistent” opinion of human “domination” over nature we believe that it is advisable to acquaint pupils with the negative impact of human activity that bring to destroyed balance in nature in order to make them develop a responsible attitude to environment. These impressions would help by particular examples and would significantly facilitate the efforts exerted by the pedagogue to convince pupils in the fictitious domination of man over nature. Every touch to nature contributes to the greatest extent to awakening of interest to natural environment and its protection.

The syllabus contents of “Man and Nature” is rich in information of natural objects, processes and phenomena, it reveals the unity and variety of inanimate and animate nature. The use of inter-subject ties contributes to building the general picture of nature, brings variety to the educational process, and enhances pupils' motivation and positive emotions. The types and kinds of inter-subject ties are

reviewed in details by Mihaylov and Tsvetanova-Churukova in „Issues of teaching Roden kray (local history and geography), Natural history and National history and geography”. In our opinion with the use of literature and arts one can provoke an increased curiosity in children with regard to nature, as the analysis of pieces of the said school subjects has a significant emotional influence and provides an opportunity for subjective interpretation, creativity and fantasy. First, the literature develops pupils’ verbal and written speech and enriches their vocabulary, which is visible in the presentation of results from observations, exploration and research works. Second, the inter-subject ties with Fine Arts could be systematized in skills of rational and economical use of materials, in knowledge of relations and dependencies between living organisms themselves, between them and environment; in knowledge of the essence and manifestation of environmental problems, human role in their occurrence and overcoming, in knowledge of colours (contrast, tinges, nuances, warm and cool colours), shapes (using various sorts of plants). The major types of material used by 9-10-year-old pupils in the classes of Fine Arts are paper, fabric, clay, plasticine, paints, plastics, metals, wood, natural materials. Children apply them in the creation of pictures, appliques, decorations of various materials. The issue of acquiring knowledge and skills of rational and economic use of materials is broadly covered in the classes of Fine arts. In both the educational processes of “Man and Nature” and of Fine arts the knowledge of variety of plants is extended and strengthened and an environment-friendly behaviour in their collection is established. Beside the herbarium plants one can use live ones – wild or cultivated. Pupils observe their growth and development, get acquainted with plant systems, follow the processes of coming into leaves, flowering, fruit and seeds forming and other phenomena. Analogically in the studies of animals pupils come to know the variety of animals, the conditions necessary for their existence, the human role in the preservation of the variety of species, the cares for cattle breeding and pets. Some cattle and animals are appropriate for observation as they can be seen in surrounding environment, in zoos, aquariums, terrariums, etc. The collections of dried plants and animals and the moist preparations as a form of preservation of those arouse excitement in pupils. Third, most of the topics in school books of fine arts for elementary schools are conducive to extension of knowledge of nature and are sources of ideas in the creation of pieces of art. Integration is implemented with other school subjects, too, and Home Economy has its significant role as the teaching process covers the safe use of natural materials (in making dressing-cases, feeding racks for animals, homes for birds) and the exploration of their properties with regard to their various designations, as well as in fine arts. The physical education also plays an important role by organizing trips, excursions, etc. In our opinion the positive attitude towards nature is established mainly through the actual touch with it. Therefore the observations, experiments close to nature, trips, visits to zoos and museums are important as they provide the children with the opportunity to observe various natural objects and phenomena in their natural environment and to conduct experiments. Prior to proceeding to experiments it is of utmost importance to explain their goal and safety rules; otherwise pupils’ health is put to risk endangered due to situations of rashness and emotionality. It should be emphasized that the issue of preservation and restoration of natural environment is deeply realized and covered in teaching. Man is a part of animate nature, therefore plants and animals are studied in connection with man and human impact on them. The child by getting acquainted with the variety of nature acquires points of support to experiment. There is a zeal for exploration and discovery innate in every pupil and it can be treated as an adaptation upon changing conditions of surrounding environment, so that he/she feels significant, important, deserving knowledge and respect. Of course we agree that these manifestations are more awake and developed in brighter students. This way observation, orientation, analysis and comparison become purposeful and comprehensive. We believe that such an exploring spirit of child results throughout the years in initiative attitude and entrepreneur skills in the individual – one of the eight key competences at European school, of decisive significance for the personal realization and development. (European Commission /EACEA/Eurydice, 2012. Developing Key Competences at School in Europe: Challenges and Opportunities for Educational Policy. Thematic report under the Eurydice Programme. Luxembourg: Publications office of the European Union, p. 7-8). The absence of exploring behaviour in young students is considered a symptom of psychological failure.

Mystery and beauty of nature urge on the desire to get acquainted with it, and children with their exploring spirit communicate and experiment with it as it gives them the opportunity to find answers



of their questions by themselves. The knowledge of nature stimulates their attentiveness to environment, makes them develop behaviour aimed at its protection and preservation. Nature is an inexhaustible source of children's observations and experiments, and interaction with it is natural as children intuitively feel themselves a part of it. We consider observation and experiment major methods for acquaintance of children with nature, and creativity – a major component of exploring activity. Therefore, there is interdependence between exploring behaviour, intellect and creativity. The last one is strengthened by the opportunity children have to find facts they will study, to use their discretion in proceeding to their research and to be interested in the occurring issues and questions to be solved. Measurement, orientation, estimation, counting, observation, research and experiment accompany the process of establishment of exploring skills in pupils during each season. All these processes are accompanied by questions and tasks. In experiment the observation proves to be necessary and automatically precedes the experiment itself because through observation the explorer studies a particular phenomenon, develops his/her notion of its nature and outlines a route for its experimental studying. The essence of observation covers a sensory cognition of natural objects through various forms of perception – visual, aural, tactile, motor, olfactory. The proper organization of sensory perception of nature contributes to the establishment and development in children of a clear notion of animals and plants, of seasonal events. The observation of natural objects covers estimation, counting and measurement. For example the growth rate of a particular plant can be assessed through making marks on the post placed next to it. There are different options for observation and exploration of nature, each of them is usually preceded by instructions. It is important to note first that upon their growing up and transfer from the kindergarten to school, in their acquaintance with nature children reject the initially adopted mystical explanations of natural phenomena and processes, as for example, the allegation that spring wakes the snowdrop up. Second, the pupils' ability to focus their attention in the course of observation results from their interest in and joy with expectation. The common experiences of children are important for the establishment of relations of friendship and cooperation. While forming their exploring skills children feel great joy with the changes made in nature. These skills cover work with texts, defending and supporting one's ideas, the skill to be aware of the problems, to ask questions and build hypotheses, the conduct of observations and experiments, making deductions and drawing conclusions, the aspiration for demonstration of creativity and independence in cognitive activity. It is very important to define the specificities of functioning of exploring skills in various stages of development of cognitive activity (need – motive – goal – decision of the ways for the achievement of the goal – activity for the achievement of the goal - results). The major methods stated, as well as the excursions as an organizational form loved by children, in their essence are also a form of exploring activity. Exploring work of pupils can make them engrossed in collecting plant and animal species. This interest should be fostered, but it should be also emphasized that unexperienced collection can bring harm to natural environment. Therefore pupils have to be taught how to organize their collections properly by being aware of plant and animal species threatened with extinction in order not to collect them. Usually collections of animals are made using photography. In the establishment of their collections pupils should be clearly aware of the designation of visual aids. Therefore the exploring activity should always be accompanied by goal setting, planning, control on performance, analysis of results, finding eventual mistakes and the reasons for them. The last one affirms the state of uncertainty and doubt during trials and experiments. It is important to make a distinction between a trial and an experiment, though reporting of results, checking of hypothesis, describing of work performed and drawing of conclusions is typical for both. A distinction is made by Kabasanova (1978, p.11), according to whom the major difference is „reduced to the different didactic objective they have to achieve – the trial establishes findings with regard to educational phenomena, while the experiment changes them”. The high value of both lies in the fact that the manner of solution of problem is chosen independently and object's features (characteristics) that remain hidden in the course of observation are being revealed, and a priority of the experiment is to produce a subjectively new product. The major objective of both is to make students realize their knowledge in certain practical situations, to study some phenomena that could not be observed immediately in natural environment thus receiving sensory perceptions needed to reveal the essence of the studied objects, substances or phenomena. All these develop children's curiosity directing their attention to revealing the links of causality between phenomena and to formulation of conclusions. For example children's

trials concerning plant development under different conditions contributes to the development of their abilities to compare, analyze, summarize, gain knowledge through particular observations. Generally, experiments and trials are used to acquaint pupils with inanimate nature: for example in studying the properties of substances and bodies, aggregate states of substances, water circle, air movement, environment factors, etc.; with animate nature: in studying plants, proving the relationship between animate and inanimate nature. The classes of "Man and Nature" at elementary school are aimed at providing children with knowledge of the major components of environment. Trials to reproduce a natural phenomenon under laboratory conditions are often implemented in classes, as well as acquaintance with the peculiarities of objects or with properties of substances. Trials and experiments have a great significance for the development of pupils' cognitive abilities and creativity, as they provide children with the opportunity to study various processes, the properties of different natural objects and to understand some natural phenomena.

We consider it necessary to study the particular learning interest of children in order to achieve a successful development of their emotional and value attitude towards nature. Issues related to the establishment and development of exploring skills in students are thoroughly studied by A.N. Poddyakov, N.N. Poddyakov, Savenkov, etc. The last mentioned (no date) draws the attention to the individual specificities of exploring behaviour and level of development of exploring skills. He distinguishes the mental need in exploring activity as being very important and underlying the exploring behaviour, and defines the unconditioned reflex as the basic one. According to the opinion of A.N. Poddyakov (no date) exploring behaviour plays an irreplaceable part in mastering new fields, gaining social experience and personal development, whereby it functions and develops under the influence of personal and social factors.

Children's strive for independent exploration of surrounding environment is a need of human mentality. Independent work has its significance for the development of children's knowledge of nature and their exploring activities by shortening the distance between them and nature. It stimulates cognitive interests and contributes to the development of keenness of observation, thinking and speech. Undisputedly the teacher takes part in it, but just as a participant in the process, not as a leader. Kabasanova studies the factors determining the extent of pupils' independence in the use of experiment and ranks among them the following: the role of approach in demonstrational experiment and that of the organization in the laboratory and individual experiment. (1978, p.28-38)

Last but not least we reckon that a clear and categorical distinction is to be made between the purposeful scientific observations, trials, experiments and children's play, though the first ones are frequently carried out with components of play and though in all these activities pupils amass impressions, experience and establish their own exploring skills. Some trials and experiments are accompanied by strict rules, which violation threatens children's health, and do not allow involvement of play elements, but others do. The materials used for them, as well as those used for games should be close to children's daily round and significant for their life. What should a pedagogue take into consideration when organizing children's experimental activity? He/she just has to show interest to their favourite activity, to bring them up with confidence in their own strength, persistence in experiment carrying out, to avoid negative assessment of children's ideas.... and not to forget that criticism is an enemy of creativity.

The process of establishment of exploring skills in children has its priorities: they improve their knowledge and vocabulary, gain experience based on their own observations and experiments, obtain opportunities to use tools, equipment and materials, receive help for solving problems, build up self-confidence and trust in exploration activity. The reproductive style of teaching is overcome; the transition is facilitated from quantitative dimensions of studies manifested in facts and data into qualitative learning of lessons, with the opportunity of analysis, comparison, generalization. In other words an interactive environment is established. The teacher once being a basic source of information now becomes a consultant, an organizer. Pupils become the active participants in the process of education, and can change its course based on their experience and background.

In acquaintance of pupils with nature their exploring skills are established and developed, in cognitive aspect (knowledge of nature, man and society), technical aspect (rules and means of activity),

technological (algorithmic prescriptions), creative (experience from creative-transformation activity) and ideological aspect (emotional-assessment attitude towards reality) taking into account their individual and age peculiarities; fostering children's imagination, creativity, learning activity and behaviour. This way all the aspects of human culture are developed and extended. Children of nowadays society build up their position of life with regard to people and world too early, and their earlier maturity leaves its marks and is manifested in their behaviour. The huge quantity of information they receive undisputedly expands their horizon. Every child can be an explorer as he/she has the ability to fancy and to offer unusual solutions, and at this point the role of the teacher is to be emphasized, as the teacher is the one who should provide the child with versatile knowledge of exploring activity. Through experiences close to nature a direct contact with the natural environment is implemented that stimulates pupils' interest for "miracles of nature", develops key competences and skills, extends their social experience, establishes work habits and skills, develops their sensitiveness and value attitude towards nature, establishes love for it, habituates environment-friendly behaviour, forms active and action-oriented attitude to natural environment, establishes their view of life. Thus nature is identified with "value of culture", as established by Yanakieva. (1994, p.5) The skills established through exploring activities in the classes of "Man and nature" has a deep personal sense for the pupil, as they alone are a personal achievement for him/her. The presence of natural environment in children's life and education is very topical on the one hand, as human activity is devastating for nature, and on the other hand, because the modern manner of life makes the man a consumer and takes him away from nature and environment-friendly lifestyle. The pedagogue at elementary school shall meet his/her vocation if through his/her educational and upbringing work each pupil learns how to think, and nature and air around him/her acquire a new meaning.

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