

TEN THESES ON MODERN NATURAL SCIENCE EDUCATION

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Despite of the fact that natural science education questions are constantly discussed, it is necessary to give much more real attention to this area. It is obvious that the spectrum of the topics of natural science education is too wide and one short article should not manage to cover all burning questions. The author has not raised a task to „exhaustively discuss“ the problems of natural science education. The author held the view that it is important to draw attention to some key moments. The most underlying ideas / theses of modern natural science education are as follows:

- It is necessary to form a system that would comprise the knowledge accumulated by all natural sciences establishing the linkage between subjects, integrating the knowledge of natural sciences, creating a picture of the world and *turning back to the undivided individual world*. Thus, in order to clearly realize and understand our environment and nature, to perceive therein existing relations between phenomena and laws, to have orientation in nature following the latest requirements for a scientific knowledge, it is equally important both, the differentiation and integration of natural sciences: the reconstruction of the “disjoined” nature as a unified system in a more advanced level of a theoretic cognition. The task to be resolved is in no manner easy; still the solution has to necessarily be found. The emphasis is put today on one of the reasons indicating why interest in natural sciences is decreasing. The point is that *natural science education (physics, chemistry, biology, etc.) stands behind the latest academic science achievements*. In order to know human being, one must to understand him without limitation to any solitary sciences or their groups. One has to combine a plenty of sciences, i.e. sociology, economics, history, philology, technology, etc. The look at reality (nature and human being) through the eyes and the mind of a philosopher is acclaimed to be a relevant point to wider realize nature and human being. Philosophy that makes use of empirically generalized and collected data of natural and social sciences as well as the statements created by way of philosophers’ *apriori* thinking, draws generalized conclusions about nature, human being and his/her place and role in nature and society. The necessity of **systemic thinking** (approach) unfolds and implements natural science education. Nature study (in a broad sense) is a complex, specific subject. Human being needs to be trained to feel nature and research it what makes him able to immediately communicate with it. Nature value awareness, experience and practic impersonation are the fundamental manifestations of the interaction between human being and nature. This is one of the primary tasks of natural science education in the 21st century.
- Natural science education is a field of social sciences (primarily educology / educational sciences). **Public society approach to natural science education** (general needs, general level of culture, traditions in the light of interaction with nature, the need to

have society and the young generation of a privileged natural science background, etc.), **its optimal conditions of implementation** (the standards of natural science education and material, human, etc. resources undertaking their success), **the development of the needs and motivation of nature study (in a broad sense)** (improving the need to perceive nature throughout all studies in comprehensive school, enhancing cognitive relation with nature, etc.), **natural science results: knowledge, abilities, relations** (studying natural sciences, etc.) are the crucial components of natural science education

- The formation of **scientific research activity (SRA)** abilities acquired in comprehensive school is undoubtedly a very important field that has not received a proper attention yet. SRA should be highly stimulated and developed. Scientific research activity is responsible thorough work requiring great self-independence rather than entertainment. It makes student analytical thinking stronger and develops abilities to search for and use information, which helps them with learning how to analyze gathered material, prepare reports, make research presentations etc. Scant attention to scientific research activity is one of the reasons why science classes are not that liked by the learners. School must be the place where the learner could realize him/herself, consider and express his/her real wishes and discover how to choose important and complicated things. School has to create a cosy atmosphere for students with free and creative self-expression. Therefore, starting from school, conditions allowing the students to perceive their wishes, desires, feelings and abilities have to be formed taking into account an opportunity to apply them in practice. In this case, SRA is one of the above mentioned activities as it creates possibilities of developing learner scientific and critical thinking, insights, creativity and personal features.
- A child faces nature very early, and therefore s/he needs to acknowledge it. We should help children to know it, to make them engaged in the environment they live, to approve their close interaction with natural phenomena and to explain the complexity of natural objects from earliest childhood. After all, it is not enough to say „I love nature“. S/he has to admire, feel and confess it. The better a man perceives nature, the stronger becomes his/her correlation with the environment. The man turns into individuality. A human personality cannot progress if isolated from an animate environment. This cohesion should be fostered on the basis of peace from the early days. Analytic investigations in nature are highly important to all human stages of ontogenesis. The school forms the abilities of research work. The learned skills at nature acquisition will be helpful for daily life of the man. Teachers have to aware the role of research and analytic activities for patterning natural science world outlook of a young man. Reading books is not a key for nature perception. Even the latest computer technologies cannot suggest such information about nature that can be obtained through the observation and studies of natural phenomena. Children should be taught to feel nature rather than to be locked in the classroom. We are surprised that our learners' knowledge of natural science is dead. Schoolchildren's teaching through the observation of animate nature is one of the key ideas of the modern science education.
- The **respect for life** educational process is extremely important. The achievements of natural sciences are striking today. The Universe, stars, planets, substances and their structure (mega and micro world) are the objects of research. On the one part, everything is brilliant but on the other part, the man and created technologies behave cruelly and remorsefully towards both nature and human being. The inward world is getting poor, the needs of consumerism have grown into compulsion of spoliation (a pragmatic correlation with nature). The youth's behaviour changes. They frequently kill and torture animals, act aggressively and sadistically. We simply cannot live and

think that *apres moi le deluge*. We must save the Earth which is our unique shelter for the future generations. Thus, we have to foster respect for everything around us since early childhood. The teachers should speak about respect for life in the classroom, about the integration of the educational content of universe science and other subjects more frequently as the level of pupils' concept of respect for life is insufficient. There is no doubt that contemporary school has to look after the moral structure of the young people's inner world, to develop new relations with nature and form ecologic consciousness, duty and responsibility of a person.

- Natural science education is an integral phenomenon that can be grasped as a whole science. It is disintegrated in the substantial parts such as ecology, environment education, etc. The parts of any of the units advance and finally settle in the complete wholeness. In order to understand the problems of natural science education, they have to be investigated complexly embracing different fields and levels.
- The content of natural science education gives a chance to the dynamics and structure of the educational process. However, the adaptation of natural science knowledge system depends on both the teacher (choosing and applying teaching methods and forms, etc.) and the pupil (the methods of learning, motivation, general abilities). The diversity of teaching and learning content, forms and methods, activities are typical of natural science education. All that makes the educational process effective: develop intellectual knowledge and skills, set out conditions for intense pupils' activities, shape thinking, foster aesthetic feelings, etc. The importance of natural science education to the development of the child's personality is absolutely significant.
- Ecology education is a permanent process, thus it has to coherently take place in all forms of comprehensive school. Every age range is useful for ecology education. Therefore, we cannot think that if something has been lost in primary school, we will have a chance improve. Full attention should be turned to primary school pupils as they receive propaedeutic, systemized and integral knowledge about nature which is the basis for the adaptation of information and attitudes (for example, environment protection) as well as for humanistic, aesthetic and cognitive motivation. Knowledge (information) about ecology could effectively be implemented only if suitable material facilities of training existed. Primary ecology education is a coexisting part of an immediate interest in nature, fauna and flora care, inhabited locality protection, responsibility for the results of human activity in nature. The sampling, adaptation and implementation of the content of ecology education using particular means (material facilities) are the foremost stages of integration. It could be justly maintained that *ecology is an integral component of primary natural science education*.
- **The extracurricular activities of natural science education (EANSE)** is one of the most significant fields of natural science education. The field hides inside numerous opportunities of choice. Whatever advanced natural science education is – it omits the functions and do not provide the opportunities that could be offered by the EANSE. Teaching is not and cannot be limited only by classes at any stage of the educational system. Pupils gain new experience in the extracurricular activities that is very important to broadening of creativity and other properties relevant to modern life. The usage of the latest information technologies, communication and cooperation, group work, the change of ideas and a critical approach towards social reality are the greatest abilities of human being in a new century.
- Nowadays ICT is rapidly developing. Different technologies are being created. The growth is characteristic not only at university level but also at other levels of the education system. It is accepted that ICT makes the process of teaching/learning more effective and beneficial whereas the education system starts functioning faster.

The development of ICT and the process of globalization determine alteration in the education system as well as in the whole society. The implementation of new technologies in the educational process raises new possibilities for both teacher and learner, enhances education quality and makes the educational process more versatile. Therefore, technologies should not alienate from human being and reality. We should devote all our efforts to stimulating youth interest in science and technologies and to reinforcing scientific-technological education at all levels. Although hardly anyone suspects that technologies are having a growing impact on our daily life, however, they are still remain alienated from the major part of society members and policy makers and what is more, frequently stand outside the door of the education system. Hence, opening the door is the obligation of all of us.

The mentioned ten thesis correlate with natural science literacy in one way or another. It is clear that poor attention is paid to natural science education till now. Public natural science literacy is low. In the 21st century, every person encounters pressing problems of environment pollution, nature devastation, health, etc. New socio-ecologic issues become pronounced (for example, air ionization in the room determined by computers). 21st century is the one of technologies, genetics and information. We will be made to live a different life. The present situation is stressful, for example, overwork with computers, TV and other technologies determine a headache, sight problems, claustrophobia, etc. The man has a majestic and powerful mind but often is full of evil spirit. He has a wish and possibility of making. However, he successfully destroys the creation. The scientists have expressed a serious concern over nature. Therefore, natural science education is not the only subject of discussions today. It is more frequently examined in a very broad context which is *natural science – technological – noospheric* education. The professionals of natural science education accept personal responsibility for the creation and extension of natural science education which is supposed to be a primary duty and obligation. Consequently, training of the comprehensive school teachers of natural sciences and the permanent development of natural science competence are very important features from this point of view. School cannot effectively work without the teachers and education managers of suitable qualification. Generally speaking, natural science education is an integral part of general education and educatedness.

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