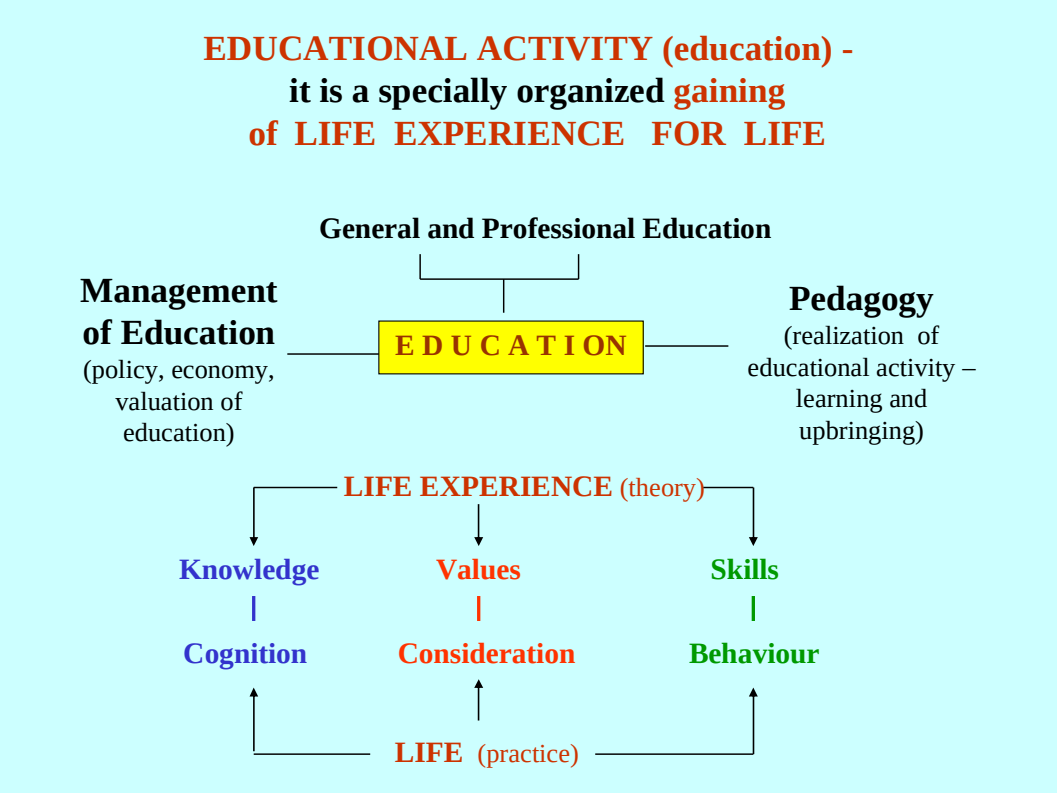
International Scientific – Practical Conference
"INFORMATION & COMMUNICATION TECHNOLOGY IN NATURAL SCIENCE EDUCATION"
11-14 November 2010, Šiauliai University, Lithuania

SOME GENERAL TRENDS WITHIN THE DEVELOPMENT OF MODERN NATURAL SCIENCE AND TECHNOLOGY EDUCATION IN THE BEGINNING OF 21ST CENTURY (conference report material)

Andris Broks
University of Latvia, Latvia
E-mail: andris.broks@lu.lv

Introduction

As a result of tremendous development of science and technology our modern life has become very complex. Diversity and speed has become the main characteristics of our life today. Actual changes in life always are followed by corresponding changes (reforms and transformations) in education, because education means specially organized gaining of life experience for life. Life experience – it means not only knowledge, not only knowledge and skills, but all together knowledge, attitudes or values and skills (Broks,2010).



Education as a process of gaining life experience includes not only traditional learning/teaching, but also development of corresponding value orientation – attitudes. This note is very important today when globalization processes have initiated a loss of clear value orientation for future development of human's life on global as well as on local scale. World needs more clever and honest people tomorrow when we have today.

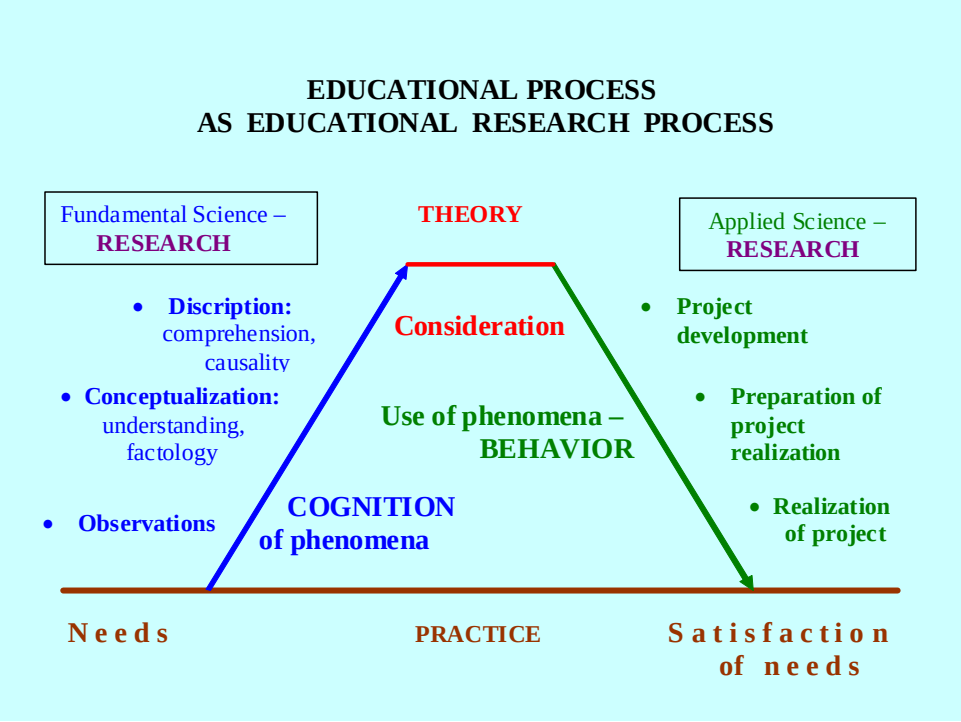
Reconsideration of the Content of Modern Natural Science and Technology Education (NSTE)

Today it is becoming clear that two basic kinds of modern education must be separated and joined in much better way as it is done in traditional education systems (Broks,2010). The content of General NSTE today is overcrowded with detailed professional knowledge as well as skills and follows outdated structures of text books and other educational materials. Ontodidactics propose systemic generalization of educational content and such approach has been reported as possible solution to improve the situation with overcrowded content of General NSTE (Broks,2010; Ostergaard E., Hugo A., Dahlin B. (2007). At the same time General NSTE today traditionally proposes only learning and teaching – gaining knowledge and skills with very small attention paid to develop also corresponding attitudes or value orientation. General NSTE has to insure balanced development of human's spirit what means systemic taking care of mind, feelings and will.

Modern Professional NSTE needs serious improvement of contacts with professionals in real practice. Based on high quality General NSTE modern professional NSTE has to get active support from corresponding professionals in order to learn really modern updated technologies.

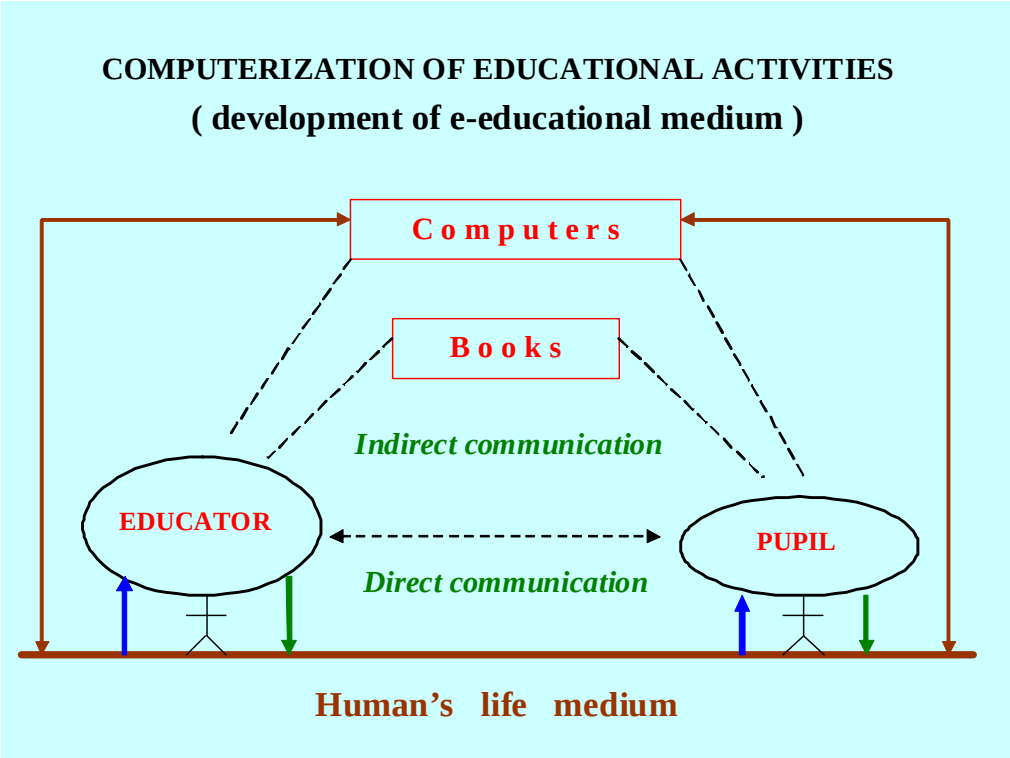
Development of New Pedagogical Approaches within Modern NSTE

There is actual need today for a new generation of creative and self dependent people in general and specialists in particular. First of all our traditional teaching/learning process must be changed to educational process (Broks,2010). Instead of traditional drilling with the aim to memorize and then formally repeat facts and actions modern constructivist approach is developing (Nezvalova, Lamanauskas, Raikova, Valanides, Pekel, 2007-2009). **Educational research** (problem solving, inquiry based education) **methods** are just in time to realize pedagogical partnership relations between educators and pupils, where educators are managers of pedagogical process and pupils have their freedom and responsibility for creative and self-dependent solving of given educational research problems.



Educational research as educational process includes study of both fundamental and applied research as creative gaining of life experience for life to satisfy definite needs of the person or society.

Secondly, **modern information technologies (IT)** are successfully entering our schools to help educators as well as pupils when they are solving their educational problems. Like ontodidactics and educational research methods, IT today is actual part of the development of modern education.



Effective use of IT includes not only development of e-education materials but also e-education mediums where corresponding management of pedagogical process is possible. At the same it is worth to note that e-mediums just only adding new possibilities in educator-pupils partnership relations. Development of e-education technologies will never diminish high quality educators as pupils' educational research managers.

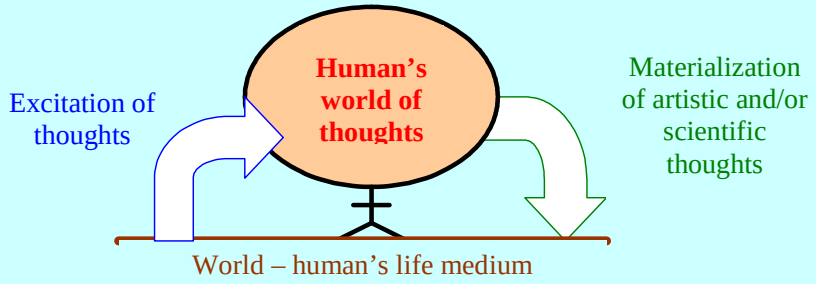
Conclusion

All mentioned above actual activities in our life and education needs study and conscious use of systems thinking. There are many gaps all around us separating parts of the whole what results in low effectiveness as well as efficiency of many our life activities. The problem of bridging these gaps has become actuality. **Modern systems theory as the theory of systems thinking** is an effective tool when solving complex problems not only in natural and technical sciences, but also in sociology and humanities (Broks, 2010; Sterling, 2003; Agoshkova (2010), 2008; Давидов, 2008; Wilber, 2007).

Systemology as applied theory of systems theory within definite branch of our life seams to be very perspective tool to manage many sophisticated situations. **Systemology of Education** is just one example of such practical use of general systems theory for solving corresponding complex social problems (Broks,2010).

Systemic organization and action of human's consciousness

T h i n k i n g – spiritual process
as systemic processing of information within human's brain



Reflection of sensed world in human's consciousness –
it means building s y s t e m s of thoughts,
it is s y s t e m s t h i n k i n g process as fundamental way
of human's conscious spiritual life.

There are artistic and scientific thought s y s t e m s
within human's consciousness

World globally and locally needs clever and honest people – good luck to all of us when developing corresponding theory and practice of education as life experience for life in the 21st century!

References

Agoshkova, E.B. (2010). SYSTEMS THINKING IN THE TWENTY-FIRST CENTURY. Available on the internet at: http://web.bu.edu/wcp/Papers/TKno/TKnoAgos.htm (accessed 30/10/2010).

Broks, A. (2010). My blog - materials in English. Available on the internet at: http://blogi.lu.lv/broks/category/materials-in-english/ (accessed 02/11/2010).

Broks, A. (2010). SOME GENERAL TRENDS WITHIN THE DEVELOPMENT OF MODERN NATURAL SCIENCE AND TECHNOLOGY EDUCATION IN THE BEGINNING OF 21ST CENTURY. Journal "Problems of Education in the 21st Century", vol.24, 2010 (editorial, pp.5-7).

Ostergaard E., Hugo A., Dahlin B. (2007). FROM PHENOMENON TO CONCEPT : DESIGNING PHENOMENOLOGICAL SCIENCE EDUCATION. - Proceedings of 6th IOSTE Symposium for Central and Eastern Europe „Science and Technology Education in Central and Eastern Europe: Past, Present and Future", Siauliai, Lithuania. – Siauliai University Publishing House, 2007 (pp.123-129).

Nezvalova, D., Lamanauskas, V., Raikova, D.Z., Valanides, N., Pekel, O.F. (2009). A CONSTRUCTIVIST APPROACH FOR THE IMPROVING QUALITY OF SCIENCE TEACHER TRAINING. Available on the internet at: http://www.iqst.upol.cz (accessed 03/11/2010).

Sterling, S. (2003). WHOLE SYSTEMS THINKING AS A BASIS FOR PARADIGM CHANGE IN EDUCATION: EXPLORATION IN THE CONTEXT OF SUSTAINABILITY. Available on the internet at: http://www.bath.ac.uk/cree/sterling/index.htm (accessed 02/11/2010).

Wilber, K.(2007). THE INTEGRAL VISION. Shambala, Boston-London. Available on the internet at: http://blogi.lu.lv/broks/files/2010/01/K.Wilber-The- integral_vision2007.pdf (accessed 02/11/2010).

Давидов А.А.(2008). СИСТЕМНАЯ СОЦИОЛОГИЯ. Москва, изд.ЛКИ, (192 стр.). Доступно в интернете на сайте: http://blogi.lu.lv/broks/info-par-gramatu-a-a-denisovs-sistemnaja-sociologija-2008/ (просмотр 30/10/2010).