



Zvyšování kvality vzdělávání učitelů přírodovědných předmětů

## Andris Broks – Introduction

*Tento projekt je spolufinancován Evropským sociálním fondem a státním rozpočtem České republiky.*



LIFE EXPERIENCE  
knowledge,  
attitudes (values),  
skills -

FOR LIFE  
cognition,  
consideration,  
behavior !

University of Latvia

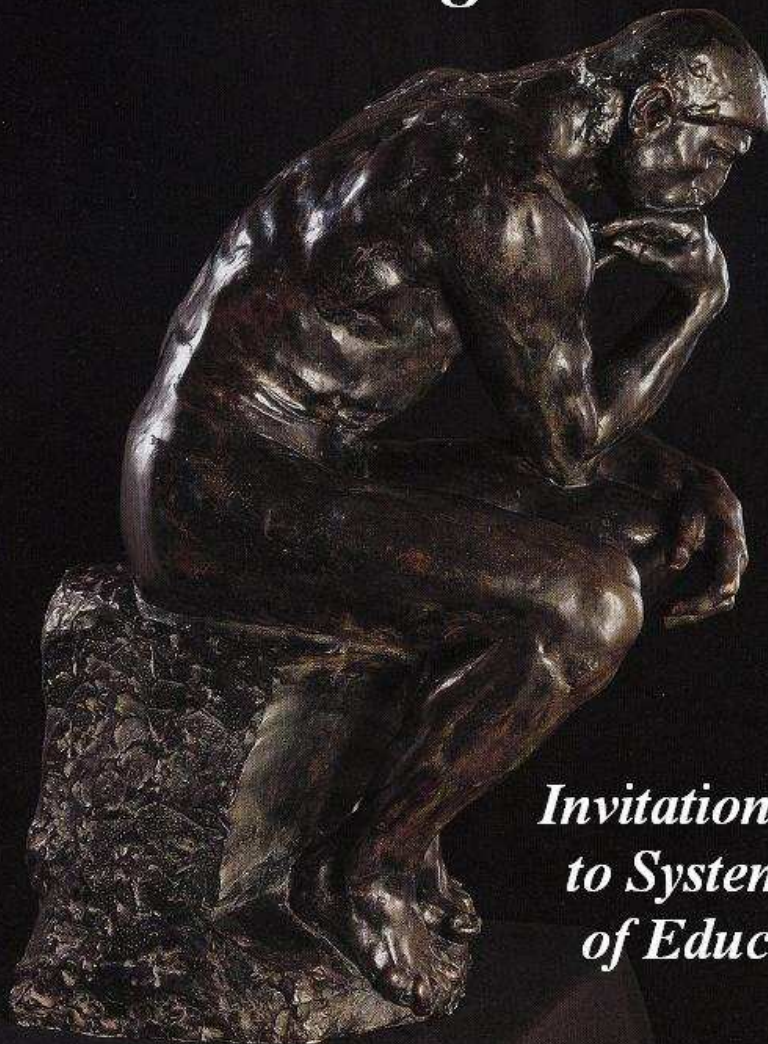
## **SYSTEMOLOGY of EDUCATION**

Assoc.prof., Dr.Phys.

**A N D R I S   B R O K S**

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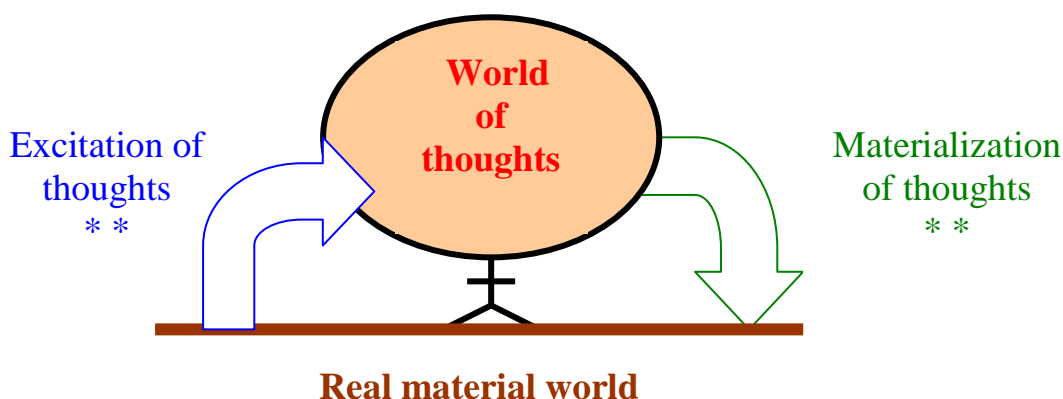
*Thinking  
about thinking !*



*Invitation  
to Systemology  
of Education*

**INTRODUCTION (systems thinking)**

**T h i n k i n g – spiritual process  
as processing of information within human’s brain,  
it is human’s consciousness in action**



**World of thoughts – human’s reflection of real (sensed) world**

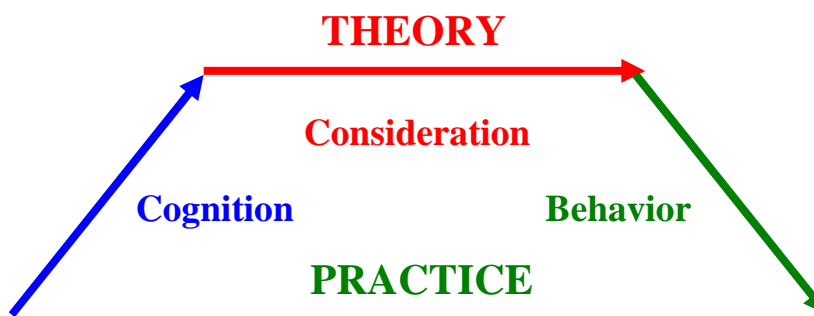
**Reflection of real world in human’s consciousness  
– it means building systems of thoughts,  
it is systems thinking process  
as fundamental way of human’s spiritual life.**

Systems thinking – it’s about universal or general form of human’s thinking,  
what is independent of concrete content of definite thinking process.

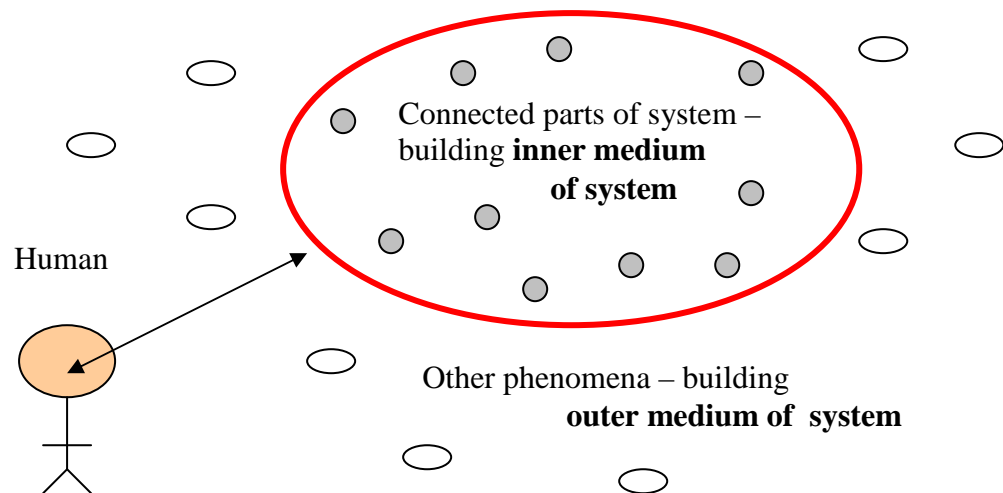
**Systems thinking** - reflection of real world by human’s selected parts, comparing and connecting them together in definite systems as a definite sets of these definitely interrelated parts within definite outer medium (environment).

**Systems theory** – general theory of human’s thinking!

**World of thoughts – it is a SYSTEM of thoughts**



## SYSTEMS THEORY – general theory of systems thinking: reflected in human's consciousness **phenomenon as a system**

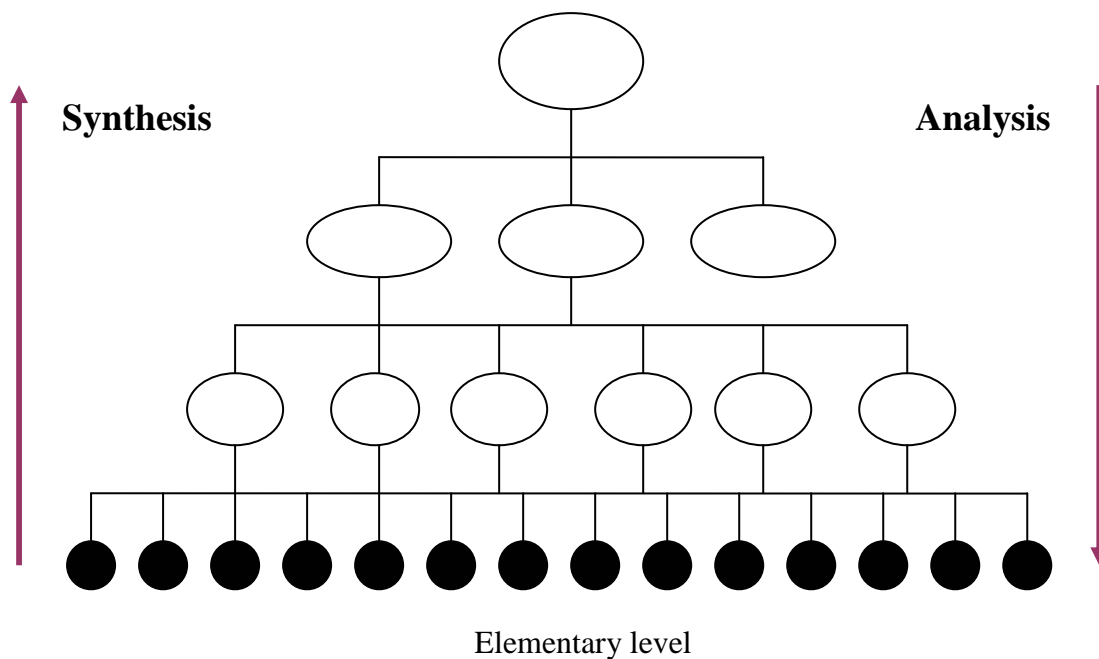


**System** – it is selected by human from other phenomena definite phenomenon (body or process) as a definite set of interrelated (connected, joined) parts of this phenomenon.

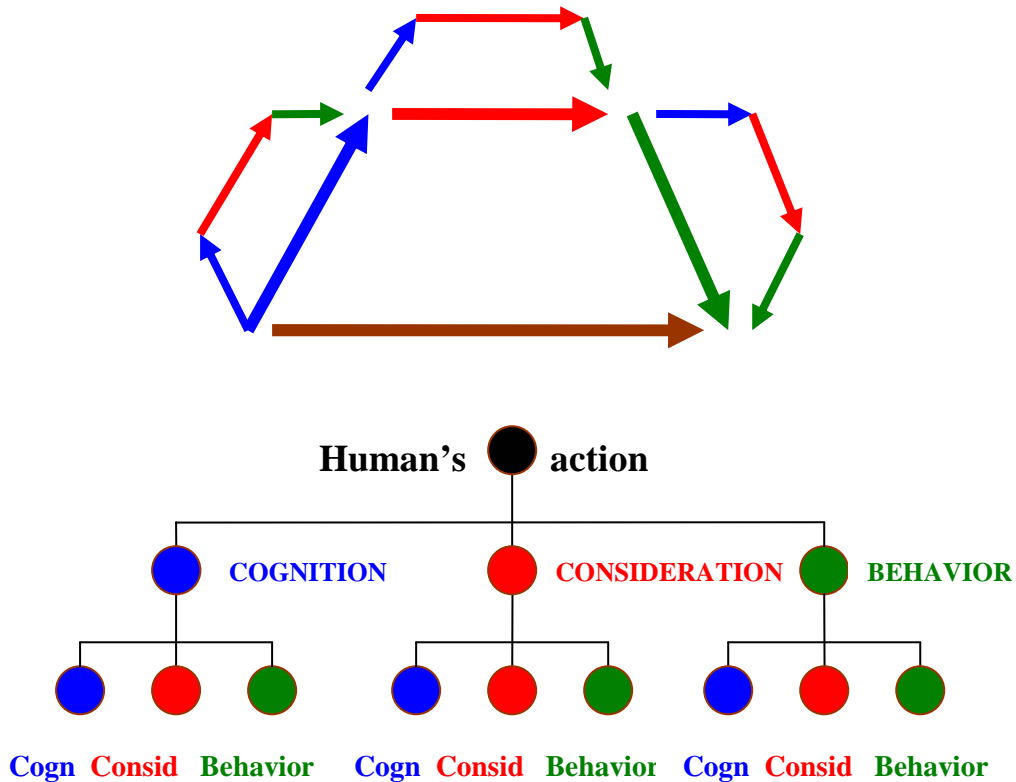
**All phenomena are reflected in human's consciousness as systems!**

**Any thought is a system**, built from other thoughts and building other thoughts.  
Thinking means systems thinking - analysis, comparison and synthesis of systems.

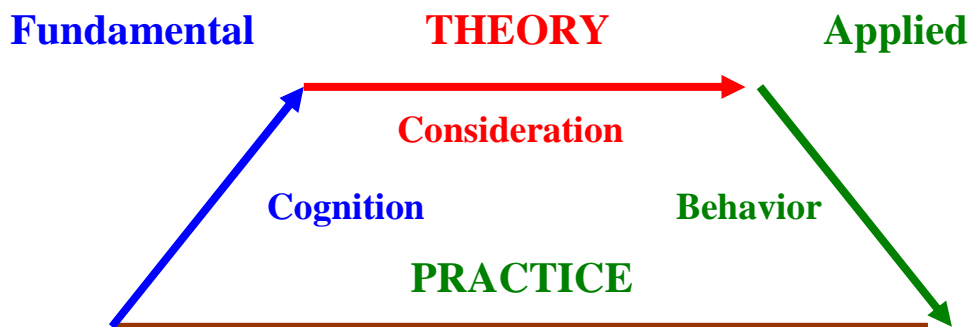
### Multilevel or hierarchical structure of systems



## Systemic visualization of two levels human's action



## SYSTEMOLOGY – applied systems theory

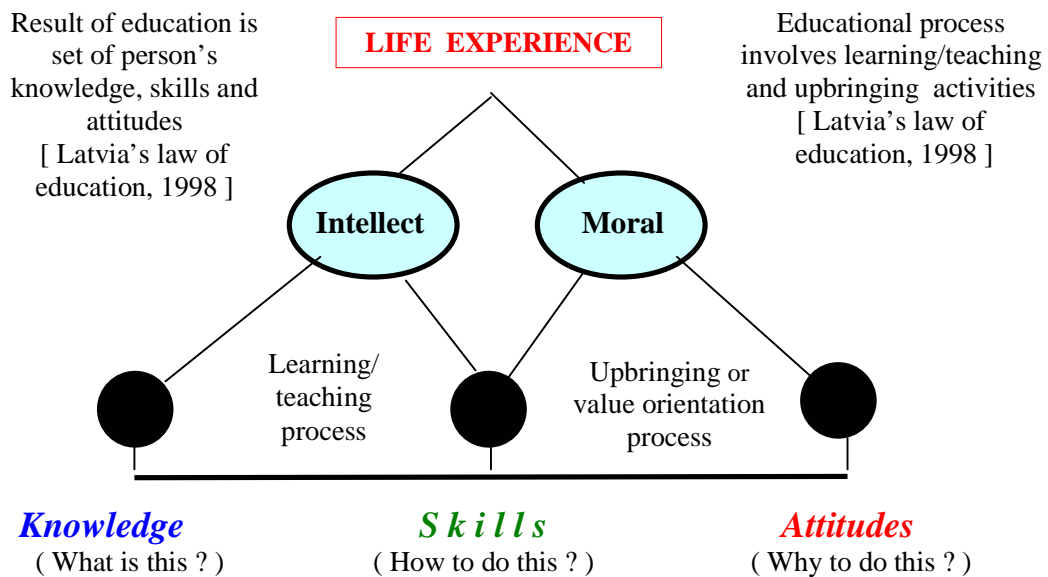


## SYSTEMOLOGY OF EDUCATION - applied systems theory of Education

# E D U C A T I O N –

it is **specially organized gaining**  
**of life experience**  
**for life.**

## General structure of human's life experience



## The principal structure of human's educatedness –

life experience (*knowledge, attitudes, skills*) for life (*cognition, consideration, behavior*)

	<b>COGNITION</b> (sensations, coding, description)	<b>CONSIDERATION</b> (valuation, goal defining, decision making)	<b>BEHAVIOR</b> (planning, providing resources, execution)
<b>SKILLS</b> - realization of abilities	<b>S k i l l s</b> of gaining information and its' analysis and synthesis	Evaluation, goal defining and decision making <b>s k i l l s</b>	<b>S k i l l s of planning, providing resources and execution</b>
<b>ATTITUDES</b> - value orientation	Cognition of values (creation of sample values - what is good?)	<b>Development of attitudes</b>	Practical realization of attitudes
<b>KNOWLEDGE</b> - facts and causality relations	<b>Obtaining knowledge (what is it and why is it so ?)</b>	Processing of knowledge (critical thinking)	Use of knowledge in practice

## INTRODUCTIONAL REMARKS ON SYSTEMS THEORY TODAY

A new century has begun, and often we hear it described as the century of information and lifelong education. A new phase in the development of mankind is being forecast, and the informational activities of people will become increasingly important in their lives. In short, we can expect many fundamental changes in the lives of people in the new century, and it is a key mission for education to understand and comprehend these changes in a timely way and to subordinate them to human interests.

The variety of pace of our lives is increasing very rapidly. Our lives are becoming more complex, and **it is critically important to ensure an overall orientation** in the flow of everyday life – an orientation which reminds us constantly that life is made up of many different details, each of them more or less important to life itself. Whether we become confused in this chaos or find ourselves able to deal with it – that is the issue upon which the lives of individuals and nations is becoming predicated.

As we enter the new century, the first question that is important is the world in which people live today – the way in which this world is understood and comprehended, the spiritual and physical essence of people in that world. We must come to understand and comprehend the way in which each person joins the flow of information and substance in the world through his or her own thinking and view, as a result of which the spiritual and physical qualities of the individual emerge through the closest correlations.

Unity of spirit and flesh, the informational essence of the spirit, the fundamental relationships between informational and material processes in everything that is alive – these are some of the general but enormously important issues which must be understood and subordinated to the interests of humans, and that, in turn, is an important mission for education. One of the main guidelines for education today, in other words, is a unification of the philosophical ( $\Phi$ ) and the psychological ( $\Psi$ ) view and understanding of the world and of the human being. In this process of coming to understand the essence of mankind at the highest level – a process which is closely related to philosophy and psychology – we find the collection of theoretical knowledge which is so important to our present-day lives and is known as systems theory.

As is the case with any theory, **systems theory** too is the product of spiritual activity by human beings – it is **created by people for people**. Peculiarly enough, however, many people don't have a sufficient understanding of the human origins of theories. The most important ideas which are related to the ongoing development and improvement of human



lives, in other words, are often either worshipped blindly or rejected out of hand. Can it be that the history of ideas has not adequately revealed the human origin of theories and the role which these theories play in the development of humankind? Perhaps so, but too many people are simply not interested in this history and in these theories. General ideas are not popular in everyday life, our lives are dominated by rapidly shifting, short-term impressions, by the hazards of the game and by the triumphs of quick victory. Sadly, traditional educational activities today are far too deeply embedded in the small details of life. **When theory is removed from practice, this is a complex and very serious phenomenon which must be considered very carefully if we are to hope for lives that are of full value in the 21<sup>st</sup> century.** The expected increase in the importance of the spiritual or information activities of human beings, after all, has everything to do with the development and practical use of the theoretical thoughts of people.

The cornerstone of system theory is made up of two fundamental assumptions that are rooted in human experience and that have been created and are being used by people themselves:

- 1) *The cause of everything is the interaction among everything, and*
- 2) *People learn about the world in parts, comparing and connecting them.*

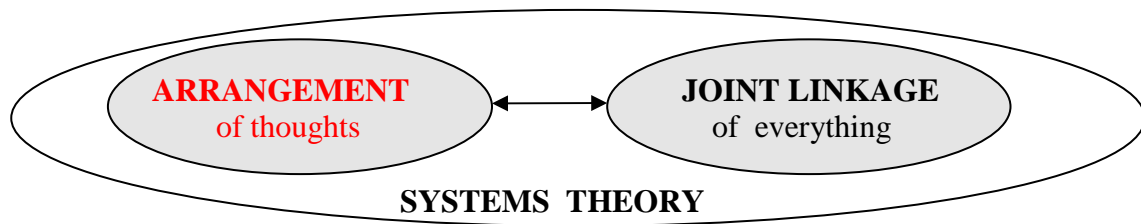
The first of these tenets is related to the philosophical ( $\Phi$ ) view of the world, in the context of which the world is a complex of diverse phenomena or changing bodies, where a human being is one of these phenomena. The second tenet is related to psychology ( $\Psi$ ) and describes the main aspects of the spiritual activities of individuals. The result of those activities is a properly ordered, abstract (ideal, modeled, virtual) reflection of the world in human's consciousness. Every conscious human action is characterized by its appropriate contents and formal **a r r a n g e m e n t a s d e f i n i t e b a l a n c e o f o r d e r a n d d i s o r d e r**; being aware of it is the basis of life organization of any sensible man.

If we collect this into a unified whole, we can say that the conceptual revelation of systems theory is contained in following statement:

**SYSTEMS THEORY IS FUNDAMENTAL SCIENTIFIC THEORY  
ABOUT THE ARRANGEMENT OF HUMAN'S THOUGHTS  
AS THE EXPRESSION OF JOINT LINKAGE OF EVERYTHING.**

**It is the theory of relations between the whole and the parts,  
it is world outlook and vision of the sensible man (homo sapiens).**





**Every phenomenon (thing and process) in the world**, including every conscious or purposeful activity by an individual, **is reflected in our consciousness as a system**. Without delving too deeply into the basic concepts of system theory, let us simply note that this theory is of key importance in the complicated conditions of our everyday lives. **System theory is very important for our general orientation in the present-day world**. If an educated person is aware of the hierarchical structures of the systems analysis and synthesis of the phenomena of the world, he or she can rise above the chaotic processes of everyday life and to create solutions of principle for the management of these processes at a higher level, where chaos is replaced with a certain level of determination. In short, **systems thinking characterizes the essence of *homo sapiens***. Sad to say, in the modern community of man, sensible people – those who are the most highly developed representatives of the species, so to say – are still in the minority. If we understand the importance of having a systemic comprehension in which we view and see flesh and spirit in unity, simultaneously revealing the informational essence of the human spirit, then we are able to expand the consciousness of everyday people in our modern world, educating them for life and work in the 21<sup>st</sup> century. If we want to prepare people for unemployment, then perhaps we need nothing more than the traditional experience of everyday life that has been accumulated over the last few centuries. Systems theory, which emerged in the 20<sup>th</sup> century, is surely becoming a part of the foundations of sensible life in the 21<sup>st</sup> century.

