UNIWERSYTET OPOLSKI

TRENDY VE VZDĚLÁVÁNÍ 2020

Termín konání: 18. - 20. 5. 2020
Olomouc, Pedagogická fakulta Univerzity Palackého

CRITICAL THINKING IN TECHNICAL ISSUES OF ECOLOGICAL EDUCATION
KRITICKÉ MYŠLENÍ V TECHNICKÝCH PROBLÉMECH EKOLOGICKÉHO VZDĚLÁVÁNÍ

dr inż. Mirosław Bąk, University of Opole

prof. dr hab. Antonina Kalinichenko, University of Opole

UNIWERSYTET OPOLSKI

CRITICAL THINKING IN TECHNICAL ISSUES OF ECOLOGICAL EDUCATION

MYŚLENIE KRYTYCZNE W ZAGADNIENIACH TECHNICZNYCH EDUKACJI EKOLOGICZNEJ

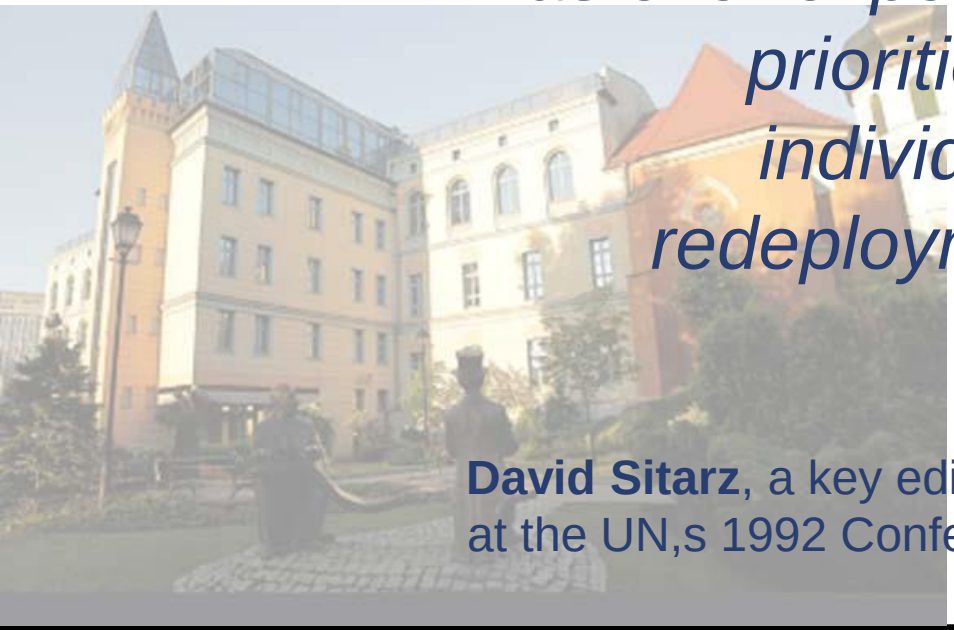
KRITICKÉ MYŠLENÍ V TECHNICKÝCH PROBLÉMECH EKOLOGICKÉHO VZDĚLÁVÁNÍ

dr inż. Mirosław Bąk

prof. dr hab. Antonina Kalinichenko

UNIWERSYTET OPOLSKI

*„Effective execution of Agenda 21 will require **a profound reorientation of all human society**, unlike anything the world has ever experienced - a major shift in the priorities of both governments and individuals and an unprecedented redeployment of human and financial resources.”*



David Sitarz, a key editor of the UN's Agenda 21 document stated at the UN,s 1992 Conference on Environment and Development in Brasil.

Introduction

- **In an era of globalisation, fast-paced technological development and strong competition, human face the need to prompt actions and coordinated answers to global chalenges.**
- **The environmental problems cross political boundaries and the objectives of environmental protection often evoke disputes and tension.**

Introduction

- ***Agenda 21*** **is a non-binding action plan of the United Nations with regard to** ***sustainable development*****.**
- **Agenda 21 is the first, significant voluntary action plan that offers suggestions for sustainable ways local, state and national governments can combat poverty and pollution and conserve natural resources in the 21st century.**

Introduction

- **Agenda 21 proposes an array of actions which are intended to be implemented by every person on Earth**
- **Sustainable development will secerely curtail man civil liberties and his right as a citizen to run your own community through your elected officials.**

Introduction

- **Such plans intervene in human community and man personal life. Every aspect of social life will be affected.**
- **Consequently, it creates a space for educational and promotional activities.**
- **Let us note, that already today informal education (e.g. through social media) plays a significant role.**

Introduction

- **Soon, most of people living in rural or suburban environments are will move to urban or centralized transportation areas. They shall live in „*smart cities*” and use a „*smart technology*”.**
- **According to this Agenda 21 promotes concepts of "*smart growth*" the central planning how your community will be organized where you live.**

Introduction

- **As a part of the global changes, the Information and Comunication Technology progress** *(ICT)* **related to the** ***Internet of Things*** *(IoT)*, ***Artificial Intelligence*** *(AI)* **in computerization of manufacturing and production, the circulation of "gigadata"** *(big data)* **is called to as the** ***Fourth Industrial Revolution*** *(4IR)*.

Introduction

- **Automation and AI will replace many of the tasks that we have previously done, can optimize material and energy use, revise communication and transport grids, reduce carbon emissions, generate clean energy, etc.**
- **Therefor it will have a significant impact on the environment.**

UNIWERSYTET OPOLSKI

"L'école prépare les enfants à vivre dans un monde qui n'existe pas."

„The school prepares us for life in the world that does not exist."

.

Albert Camus

Today's challenges for education

- **New types of interactions between the individual and society are created and the forms of mutual communication between individuals are radically changing.**
- **They can lead to the *loss of some part of one's subjectivity* and *mental performance*.**

The challenges for education

- **But today, the economic benefits of the Fourth Industrial Revolution are becoming more concentrated among a small group.**
- **This increasing inequality can lead to political polarization, social fragmentation, and lack of trust in institutions.**
- In their book, *Schwab K.* and *Davis N.* argue that the 4IR is only in its early stages and it is important not to lose the opportunities it creates.

- Schwab K.,Davis N.(2018),*Shaping the Future of the Fourth Industrial Revolution*, The Crown Publ.Group, NY.

The challenges for education

- **All these issues are very important, because we should avoid wasting the great capital and the driving force behind economic growth, namely human talents.**
- **We also, have to avoid all kinds of political and marketing manipulation and putting presure both on individuals and any social groups** (f.e. as it is in the case of social media)**.**

The challenges for education

- **That is the great challenge facing us in the near future, for both the education system and informal teaching.**
- **Critical thinking allows to meet these challenges and achieve a consensus not only by recognizing positions, arguments, conclusions presented by other people but also by skillfully recognizing manipulation techniques used by a man or dehumanized systems.**

UNIWERSYTET OPOLSKI

„Science must begin with myths, and with the criticism of myths.”

Sir Karl Raimund Popper

Critical rationalism

- **Critical rationalism is one of the dominant trends in modern philosophy in which the** fundamental principle **called falsifiability is one of the basic scientific criteria of theorem and hypothesis theories.**
- *„In so far as a scientific statement speaks about reality, it must be falsifiable; and in so far as it is it not falsifiable, it does not speak about reality”* **Karl Raimund Popper**

Cognitive relativism

- **Critical rationalism arose in some opposition to the postmodernism widely accepted in the humanities and social sciences.**
- **The ideas of cognitive relativism have their source in the works of Kuhn T.** *„The structure of scientific revolutions"* **and Feyerabend P.** *"Against the method. Outline of an Anarchistic Theory of Knowledge"*

Kuhn T. *„The structure of scientific revolutions"* (1990) Univ. Of Chicago Press; Later Printing edition;

Cognitive relativism

- **Kuhn's ideas were widly contested by many researchers, including by Steven Weinberg.**
- **Sokal A. and Bricmont J. presented categorical opposition to such to this approach from point od view the empirical sciences.**

Sokal A., Bricmont J.: *FASHIONABLE NONSENSE: Postmodern Intellectuals' Abuse of Science,* Picadore, NY (1998);

Cognitive relativism

- **However, Knut's methodology is still popularized and used at European universities, and his book is compulsory material in Poland in fields of study such as pedagogy, history, psychology, philosophy and history of science.**
- **This coincides with the widespread presentation of content on the Internet not based on scientific paradigms.**

Content on the Internet

- ***"Ideas rose in clouds; I felt them collide until pairs interlocked, so to speak, making a stable combination."***

Henri Poincaré

Content on the Internet

- **Internet services pushed through an informal, simplified, but socially relevant way of classifying content** *(based on tags)*, ***termed folksonomy***, **which, unlike scientific taxonomy, is based on social beliefs, not paradigms.**
- e.g. developed on the Internet, unethical marketing strategies such as "astroturfing" or "supporting silence" have gained political and economic importance.

Content on the Internet

- **Information overload, unification of behavior, folksonomy, combined with a confirmation strategy** *(preferring information that confirms previous beliefs)* **on a massive scale causes a polarization effect of beliefs that has nothing to do with "scientific enunciations" and is associated with division into antagonized and internally unified groups.**

Risen J., et al.: *Critical Thinking in Psychology*, Cambridge University Press, 2007, s. 110

Content on the Internet

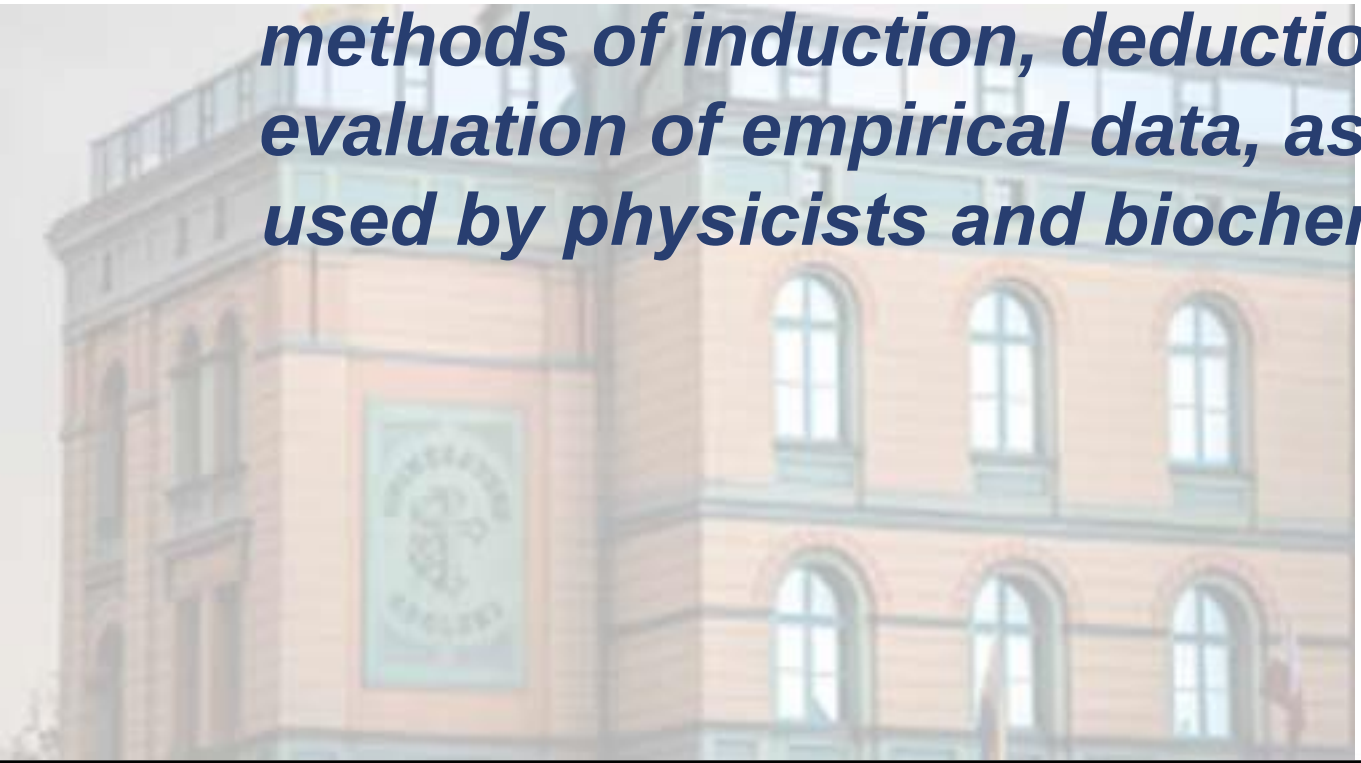
- ***„Mathematics has no symbols for vague thoughts”***

Henri Poincaré

UNIWERSYTET OPOLSKI

"Historians, detectives and plumbers - and indeed all people - use the same basic methods of induction, deduction and evaluation of empirical data, as methods used by physicists and biochemists„

Alan Sokal



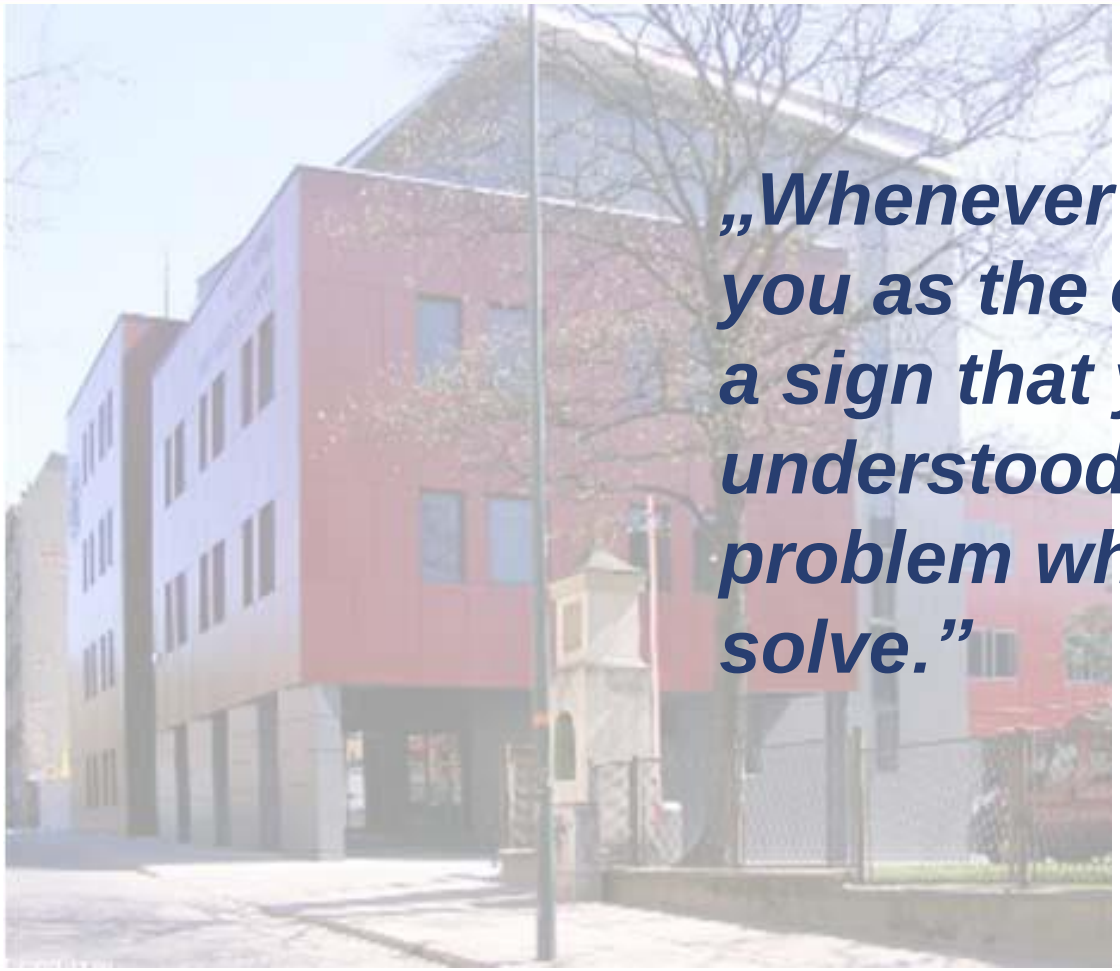
Critical thinking

- **The attitude based on critical rationalism, consisting in the fact that everything that has been deemed proven at a given moment can be called into question is the foundation of the so-called critical thinking.**
- Readiness to consider problems in a thoughtful way, supported by the ability to use methods of logical reasoning, plays an extremely important role in the education process.
- **Glaser E.**: *An experiment in the development of critical thinking*, „*The Teachers* College Record”, 1942

Critical thinking

- **The scientific method is not radically different from the rational approach in everyday life and other areas of human knowledge** (Sokal A.).
- Social belief in conclusions derived from scientific theories is based on the coherence of individual experience and **well-established knowledge obtained in the education process**.
- Recent cognitive research (Tolman E.-UC Berkeley) shows that **the mind organizes relationships with other people just like physical space.**

UNIWERSYTET OPOLSKI



„Whenever the theory appears to you as the only one, take this as a sign that you have neither understood the theory nor the problem which it was intend to solve.”

Sir Karl Raimund Popper

Critical thinking

- **Critical thinking is the method of thinking about any object, content or problem – in which the thinker improves the quality of thinking throud skillful analysis, assessment and reconstrution.**
- **The thinker is able to proprerly observe and on this basis draw conclusion independently and methodologically.**
- **Contrary to „*thinking in the cloud*“ that is the reflective thinking.**

Critical thinking

- **We owe this disciplined method of thinking to learning of mathematics and science subjects without which would be no engineering sciens.**
- **But, the pressure on innovation exerted on the educational systems, some inadequate belives of many teachers about nature of creavity may neglect the important role of critical thinking**

Critical thinking

- **In face of multi-threaded and disperced distribution of online content, critical thinking helps to fokus on selected issues. It dose not determine the fitting of new information into common patterns.**
- **Therefore, critical thinking has not to eliminate lateral thinking and can be constructive complement to it.**

Cottrell S. (2011). *Critical thinking skills: developing Effective Analysis.* London.

Conclusions

- Due to the huge increase in importance of informal education and the widespread acquisition of (not always verified) digital information, **critical thinking can be kind of barrier that protects knowledge based on scientific paradigms**.
- It can help an individual understand and adapt to automatically regulated processes and let him **find his place in 4IR society** while maintaining his individual identity.

Conclusions

- The participation of the individual in virtual reality, interactions in this environment, **require the acquisition of new competences** that will not be obtained as a result of virtual experience.
- New methods of **teaching creative and critical thinking are required** to connect knowledge from maths, physics, chemistry and technology with experience acquired in the environmental education.

UNIWERSYTET OPOLSKI

Thanks For Your Attention

CRITICAL THINKING IN TECHNICAL ISSUES OF ECOLOGICAL EDUCATION

dr inż. Mirosław Bąk, University of Opole

mirekb@uni.opole.pl

prof. dr hab. Antonina Kalinichenko, University of Opole

akalinichenko@uni.opole.pl