

The influence of STIM+E¹ education on development of critical thinking and rational reasoning for economy and democracy improvement as well as reinforcement

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GENERAL CONSIDERATIONS

The COVID-19 pandemic showed to which extent we are not prepared to face unknown dangers. At least two of them can be now recognized: the virus SARS-CoV-2 itself and too low level of critical thinking and rational reasoning of too many people. These resulted with (among others) anti-vaccine protests.

Critical thinking and rational reasoning skills can defense citizens against hate and disinformation.

Nowadays sustainable development requires urgent activities (in cooperation) of national and municipal authorities, economical and non-governmental organizations, educational institutions, media as well as all involved and interested stakeholders to improve and strengthen STIM+E¹ education as a tool for better preparation of young generation to enter the demanding, rapidly changing, labor market and for democracy. It is important for improving the way of progress in economy and citizens' wellbeing to save the natural environment on the Earth.

So far the composition of the atmosphere has been changed to such an extent that more and more often everyone can see the color and feel the smell of the air we breathe.

The more intensively we send to the atmosphere products of combustion (created by industry, transportation vehicles, households of 8 billion people, wars, forest and industry objects fires etc.), the shorter time (measured in generations) remains until there is nothing to breathe, as it was the case with water animals in the Odra river in 2022.

How to develop 'critical thinking and rational reasoning' education?

STIM+E¹ education seems to be the area appropriate and acceptable.

Some improvements in pedagogy are needed (among others) to increase the number of alumni (at all levels of formal school education) able to make everyday life decisions based on rational arguments and remain immune to hate and disinformation.

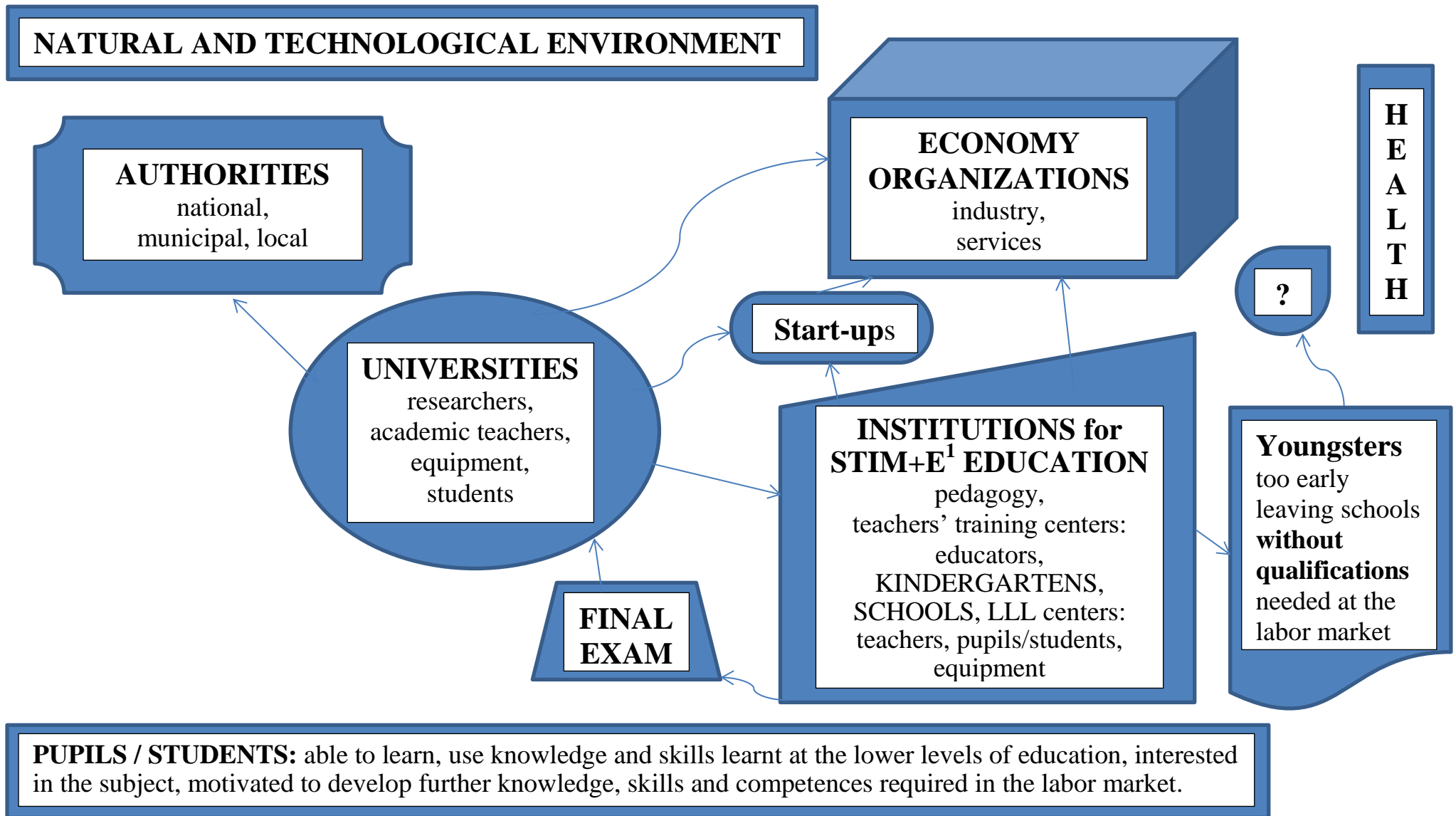
As a result, the number of: young people leaving the educational system too early without qualifications and competences needed at the labor market, as well as the level of young generation's mental illnesses, will decrease.

During "International Forum on Scientific and Technological Literacy for All" (UNESCO Headquarters, Paris, 1993) the need to draw the attention of decision-makers to sustainable development issues was emphasized, for when they attended schools ecological and environmental education was not there. After thirty years of ecological and environmental education, still not all decision-makers take into an account sustainable development aspects sufficiently – the way of teaching was not effective enough.

¹ STIM+E = Science, Technology, Informatics and Mathematics education at schools results with many Engineers

² SNPPiT = The (Polish) Association of Teachers of Natural Sciences and Technology

STIM+E¹ EDUCATION FOR ECONOMY AND SOCIETY*



*Based on A. Wojtyna-Jodko, *A new approach to science education for developing innovative thinking*, LAP, Saarbrücken 2015, p. 7.

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WHEN DO WE START TO DEVELOP SKILLS? **

	STAGES OF LIFE	STAGES OF EDUCATION	INDIVIDUAL PERSPECTIVE	INSTITUTIONAL POINT OF VIEW
Lifelong Learning (LLL) lasts from the birth till the end.	Retirement	Post-graduation courses Cross-skilling Re-skilling, Up-skilling	5. Most of the progressing economy organizations are looking for employees with needed skills developed, able to further learn and adapt to new circumstances. If we want to find many enough people skilled according to EDUCATION 4.0 ^{***} standards: problem-solving, collaboration and adaptability, we should elaborate more effective approach to the teaching/learning process from the very beginning.	
		Tertiary education	Exchange of views and experiences (to elaborate better pedagogy) among all possible parties can help the idea of Education 4.0 ^{***} to become reality and have positive impact on economy and society.	
		After-school courses Re-skilling Up-skilling		
	Employment	Secondary schools Primary school Kindergarten	4. Kindergarten and school practice shows that disordered emotional development influences and breaks ability to learn, stops intellectual development of a child. 3. Neurobiology indicates that a child suffers not having freedom to undertake own cognitive initiative.	If not earlier, too many pupils lose ability to learn during formal school education and drop out of school without skills, qualifications and competences needed (now and in the future) at demanding and rapidly changing labor market.
Education Formal Non-formal Informal				
Birth		PARENTS – the first teachers	2. Pedagogues and pediatricians confirm that the first three years of life are very important for a child to develop the body (which is controlled by medicine doctors), and mind (emotions, reason etc.). 1. Each healthy child is born with ability to learn, to examine the surrounding world with own senses, with individual cognitive initiative and creativity.	Do all countries organize sufficient institutional support for parents, providing the knowledge necessary to stimulate proper comprehensive development of their children? Parents play a role of the first teachers. They stimulate all aspects of their children's development (emotional and intellectual among others). No adult person is able to predict everything what a small child can come up with.

** Based on A. Wojtyna-Jodko, *A new approach to science education for developing innovative thinking*, LAP, Saarbrücken 2015, p. 12.

*** A. Advani, *Education 4.0*

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POSSIBLE ACTIONS

The year 2023 is special: The European Capital of Democracy 2023^{****} will be elected for the first time and “The European Commission adopted the proposal to make 2023 the European Year of Skills”^{*****}. It is the right time to start (or continue, intensify and popularize):

- **A series of international interdisciplinary conferences** on: “The influence of STIM+E¹ education on development of critical thinking and rational reasoning for economy and democracy improvement and reinforcement” to elaborate the needed new approach to the teaching/learning process to be more effective in preparing young generation to join the labor market and remain active till the retirement. From the sustainable development point of view, educating citizens to be aware of their individual impact on the natural environment is becoming more and more important.

SNPPiT has organized 16 annual interdisciplinary conferences on STIM+E¹ education at 15 universities in Poland, where all possible stakeholders were represented, to exchange views and update teachers’ knowledge in most important current issues.

- **The European Network of Associations for STIM+E¹ Education** (including teachers’ associations).

- **The European Project: “STIM+E¹ Education for Democracy at Schools”**.

- **Involvement of economy organizations:**

WHY:

- ✓ The best manager, specialist, employee is a person working with a passion.
- ✓ Many teachers have rather limited knowledge about the world outside the educational system.
- ✓ Only some children meet the chance to discover their passion and get needed preparation to the chosen job.
- ✓ Too large number of pupils and students early drop out formal school education without acquiring the skills, qualifications and competences required in the labor market and will not fulfill the gap of needed employees.

HOW:

- Welcome groups of school pupils (starting with the age of 10), present to them functioning of your organization and provide information about skills, qualifications and competences required for employment (an engineer, preferable having children at the same age, will be the right person to deal with). Children have a chance to find own passion: I want to work here!
- For these visitors organize a competition on: “How would you improve functioning of our organization?” (once a year).
- Organize seminars on important topics (for all participants of mentioned above competition), 2-3 times a year).

It doesn’t cost much. After few years your organizations will welcome new young employees highly motivated and well prepared.

The Physics Experiments Competition and The Seminar for Young Experimenters for primary and secondary school pupils were initiated by SNPPiT² and organized in co-operation at The Institute of Physics (IoP) at The Kazimierz Wielki University in Bydgoszcz for few years. At that time, the number of physics students in IoP increased significantly.

**** www.capitalofdemocracy.eu

***** <https://www.epr.eu/2023-will-be-the-european-year-of-skills/>

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