

## WHAT KIND OF RESEARCH DO WE NEED FOR DEVELOPING STL IN SCIENCE EDUCATION?

*Dear Readers!*

The effectiveness of any R&D work depends on research methodology used by studying nature, regularities and peculiarities related to the researched field of knowledge. How often have we heard that educational researches belong to 'soft studies' because all social sciences including science education belong to the soft field of knowledge. A quilty person in this case is not at all science education but educators – researchers working in the field of science education and using only soft methodology and strategies. Any educational research has the same attributes as fundamental ('strong') sciences and embraces formulating topics and a title, planning theoretical and experimental study, collecting empirical data, statistically treating the results of research etc. There is a single exception between 'soft' and 'strong' studies: in social sciences including science education, we cannot repeat experiments under the same circumstances. During the time between two parallel studies, our kids, pupils, students or currently, our respondents have changed cognitively, emotionally, communicatively etc. A number of changes in their knowledge, skills, values and even in characters can be noticed. In addition to the above mentioned changes, we fail to understand the kind of changes taking place during experimental study.

To increase the reliability, validity etc. and finally prestige and authenticity of research in science education, we must more rely on the mathematical and logical methods of study. It is not enough to use different statistical methods and strategies for treating empirical data. We should mathematically design all our work on R&D, compile mathematical and logical models of teaching and learning science and find mathematical quantities characterizing our field of knowledge. Contemporary mathematics offers us such powerful and flexible theories as set theory, graph theory, finite automata theory, algorithm theory etc.

The authorities declaring that social sciences including science education have only qualitative attributes have taken the wrong position. Quality and quantity are only abstractions that always go together in the surrounding world. Therefore, we can only speak about the qualitative attributes of the given quantity or in opposite, about the quantitative attributes of the given quality.

Dear readers and writers! Let us use more mathematical and logical research methods in R&D work of teaching and learning sciences and believe me success will come.

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