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# RESEARCH AS AN EDUCATING TOOL

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## Introduction

Every human possesses his internal scientist which promotes to inquire about the world around us consisting of different objects and processes. The main goal of the scientific process is to acquire new knowledge. Unfortunately, it is impossible to obtain scientific abilities only from theory and observations and it is required to develop the skills of research by doing everything by oneself and trying and encountering problems and allowing mistakes. So, to develop these skills, alongside theoretical lectures and challenges a cycle of practical tasks should be introduced to students.

## Importance to acquire the skills of scientific research

Old educational methods – sitting in a classroom, carefully listening and participating in a unified work rhythm – is not anymore suitable for contemporary students and teachers. During everyday routine pupils lose motivation to learn, but educators are not ready to work with low motivated students. It is necessary to involve pupils more in education process instead of only requiring them to listen and take notes. To help teachers to better understand the necessities of a particular student and find a common language with him, it is essential to teach him to think, to analyse and to find interconnecting laws, also, it is required that the student asks, expresses his option and is capable to think creatively. Research is a creative process that takes place during the events of general exploration and discoveries based on already acquired knowledge, and is open for fresh knowledge and ideas.

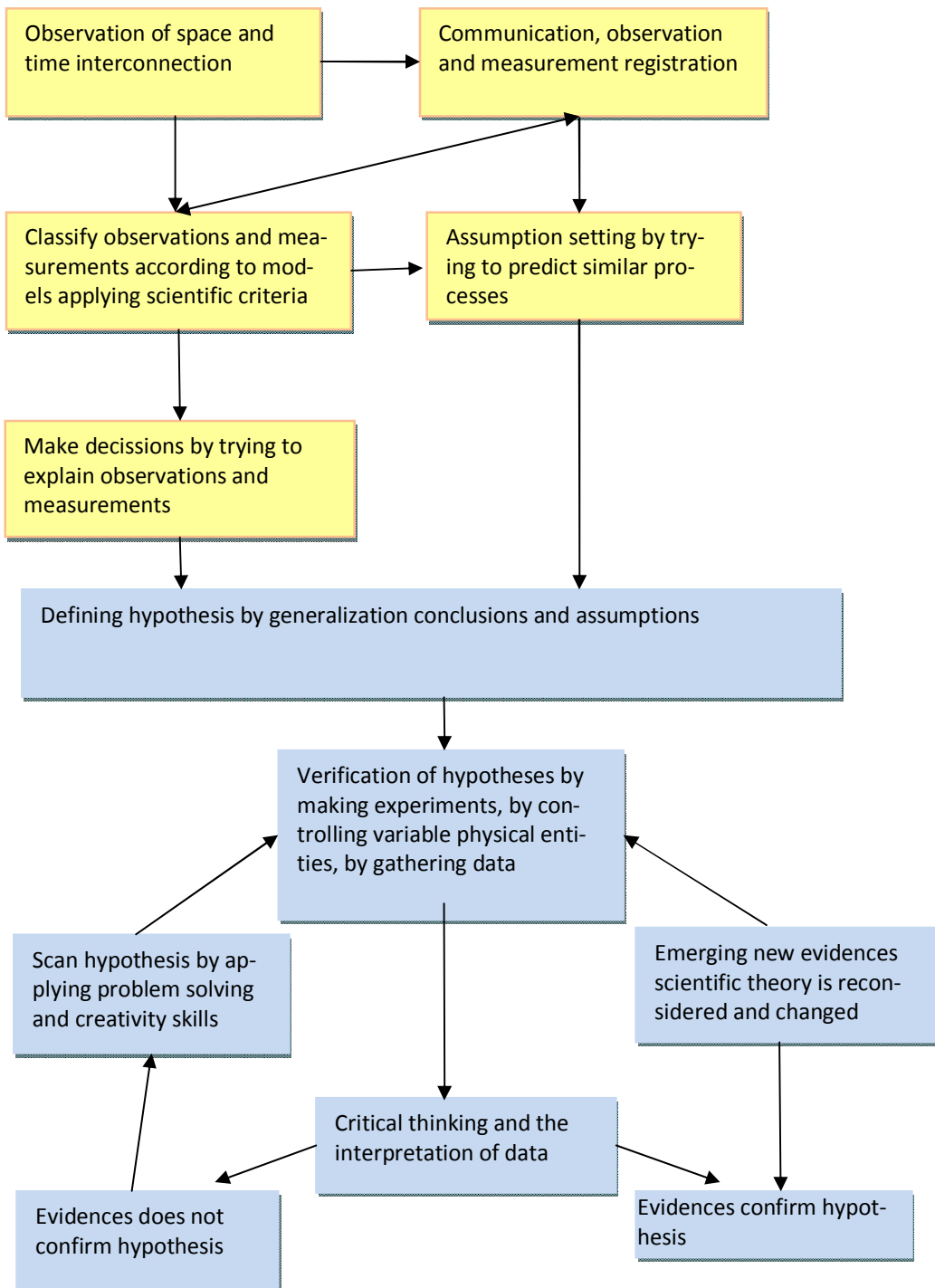
In every human there exists an internal scientist who is curious with questions about the world around, different objects and processes. Everyone should satisfy this curiosity (Mathematics and Engineering, 1998). Students can learn about the world by reading and listening about already revealed facts as well as learning through researching. Research is a core-stone for scientist to analyse and describe the world around us (American association for the advancement, 2001). Also in the education process it is possible to aspire to be as a scientist and their purposeful actions by acquiring the fundamentals of research. So, everyone of us

can become a scientist. The main goal of research is to obtain new knowledge. At the beginning student should set a goal to be able purposefully and with correct research steps- as scientists would- reveal mystery of chosen process. It is a path towards the expansion of knowledge by means of previously attained facts. By scientific process problems are being solved by scientific methods and achievements. Science is a materialistic investigation tool to reveal mystery of our universe by trying to explain objects and processes in it. According to this method the main research aspects are set up.

Research includes (see Figure 1):

1. Doing observations of the target process and set up research goals (American association for the advancement, 2001;).
2. Defining questions about observable objects and processes (American association for the advancement, 2001; Yager, Kaya, Dogan, 2007);
3. Offering an explanation for these processes and set up hypothesis (Панькина, 2006; Yager, Kaya, Dogan, 2007);
4. Verifying probability and analyse different sources of information about scientific investigation (American Association..., 2001; Yager, Kaya, Dogan, 2007);
5. Carrying out an experiment (American Association..., 2001);
6. Mining the data and analysing it (American Association..., 2001);
7. Discussing results with others, confirming and verifying outcome that is compatible with already proven concepts (Yager, Kaya, Dogan, 2007);
8. Defining new facts and interconnecting laws (American Association..., 2001).

The goal of the education process is to help to acquire the skills of scientific investigation, to think independently and make conclusions by interchanging structural elements of the education process, content, methods and approaches. An educator must have an ability to conduct education process in such a way that students enhance their importance in learning, get them interested and demonstrate the chosen target knowledge and abilities, actuality and necessity. Students are perceived as scientists who learn how to solve problems in an actual situation. The curiosity of the new scientist (student) is motivated by interests in the target process and develops practical skills. Educations process transforms into a scientifically oriented education process what is oriented towards learning and acquired of curriculum requirements simultaneously motivating students to involve in the education process. Eventually, motivation significantly affects the quality of achievement level, unfortunately the motivation isn't always developing simultaneously with the beginning of the lesson – right after the bell. The main goal of the education process is a scientific cycle, which develops in a helical manner of acquiring theoretical and practical competence (Далингер, 2007).



**Figure 1: Author: Kishore, L. (2006). Available: Kalniņa, D., Pētnieciskās prasmes attīstība dabaszinībās, 2012, Raka p. 47.**

Teacher plays an important role during scientific- educational process.

1. The ability to choose the relevant scientific investigation level, according to the student's intellectual development level.

2. The ability during the lesson to balance individual and collective scientific performance forms and their role in the structure of the lesson (Далингер, 2007).

Defined tasks plays particularly significant role in the development of skills that motivates the students to think before experiment meanwhile developing intellectual abilities. Students compare and analyze results that are obtained by finding the information about a process and gathering the knowledge of others. These tasks help to evaluate the level of scientific skills and by the conclusions made by the student teacher can determine how well prepared the student is for an independent scientific work (Далингер, 2007).

The concept of electricity is introduced for the first time in the lessons of natural science in the 6<sup>th</sup> grade. The goal is to expand the scientific ability by acquiring theory about electricity and its consumption and by fostering the interpersonal collaboration between students.

1. To learn practically implement electrical circuits following safety requirements.

2. To learn to draw electrical circuits using conventional symbols.

3. To understand the laws that govern the glow of light-bulbs by configuring particular circuit.

Teaching the topic of electricity mentioned before in form 9<sup>th</sup> and 11<sup>th</sup> graders I came to conclusion that only few students from 30 have ability to recognize elements of an electrical circuit. Consequently, the question about which aspects of scientific abilities the students have acquired and which not rises. Unfortunately, it is not possible to acquire scientific abilities only by listening theory or observing how others are working practically but only by practically doing and encountering any emerging problems and mistakes and resolving them with the support of a teacher.

Therefore, in my work I have implemented practical and scientific projects. In each class the students weekly do one practical laboratory-work. This cycle of laboratory works consist from 7 to 8 works related to an actual theoretical topic or an upcoming one. Before lab-work students receive the protocol of the work.. In case of already taught topics in the protocol only required tasks are given, so, students should independently choose instruments, formulate hypothesis, describe the routine of work, the only exception is first works in elementary school which include the instructions with brief theoretical explanation. Students perform registration of data in prepared tables, construct graphs and analyze the work, and make conclusions. In the first works tips are already given to help with

deducing the conclusion and in forthcoming work students deduce them independently or if necessary consult with the teacher. I have observed that particularly during first work students intensively seek consultations with me how to make protocol, how to draw graphs and how to make conclusions. This is how I choose to prepare the students for future scientific work. Students who choose to do scientific- educational research works in natural sciences predominantly after graduation from secondary school continues their education in physics, chemistry and biology related fields.

### Summing-up

The skills of research are acquired by experience of an actual research that enables the student independently and creatively solve the problems of the tasks presented and include research, asking, speculating, providing solutions for these practical activities by collecting, analysing and interpreting data, drawing conclusions. Then comes the step to inform others about these discoveries. This leads to the next stage – scientists research papers (ZPD), where the student is already very motivated on their own to study a phenomenon deeper, looking at both the work of other scientists and books, as well as carrying out the experiments, innovations and drawing conclusions. Students who choose to work on ZPD in natural sciences, after graduation, mainly choose to study natural sciences, IE, physics, chemistry or biology, in university.

### References

Mathematics and Engineering Education Staff Center for Science, Every child a scientist: Achieving scientific literacy for all (1998). Washington, DC: National Academies Press, p. 32

American association for the advancement of science (AAAS) Designs for Science Literacy. 2001 Oxford University Press, p. 312.

Yager, R., Kaya, O. N., Dogan, A. (2007). College science teaching changing to mirror real science in Turkish higher education. *Journal of College Science Teaching*, 36 (7), p. 50–54.

Панькина, С. И. (2006). Задачи как средство формирования исследовательских умений у студентов экономических специальностей [tiešsaite] Pieejams: <http://mce.biophys.msu.ru/rus/presentations/p2953/>

Далингер, В. А. (2007). Учебно-исследовательская деятельность учащихся в процессе изучения математики. *Электронный научный журнал «Вестник Омского государственного педагогического университета* [tiešsaite]. Pieejams: <http://www.omsk.edu/article/vestnik-omgpu-195.pdf>