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## **COGNITIVE PROBLEMS ARISING IN THE FIRST YEAR STUDENTS STUDYING SCIENCES**

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Teaching and studying sciences, including descriptive geometry and engineering graphics, is the most difficult task for students and teachers alike. The reason for this is the decrease in psychomotor skills and spatial imagination in high school graduates. Many schools do not teach technical drawing and writing texts is done with computers. Craft workshops are often with questionable quality. Planimetry and Stereometry exercises are solved using virtual models, instead of physical models. In addition to the above, the need and results of studying sciences become evident only after three to four years, after graduation, which also creates motivational tension. Motivation and ability to concentrate are utterly important in the study of sciences to master the material, unlike humanitarian subjects – languages, philosophy, etc., where one can enjoy the results directly during the learning process. Study texts are selected in such a way, that they are up-to-date and interesting to students.

Teaching methods in higher education institutions differ greatly from those in secondary schools. Volume of independent work is considerably larger. Many of the courses are structured in a way to teach students to study independently, to analyze, to give critical assessments and to use the knowledge in new emerging challenges. The studies presume the ability to use textbooks and reference books already from the first courses. In summary, the student is faced with new pedagogical-psychological surroundings. All this creates cognitive dissonance<sup>1</sup> that elicits an uncomfortable tension in the students that requires mitigation.

Let us look at the reasons, which foster the emergence of the students' cognitive dissonance<sup>1</sup>. Polls, feedback on teachers, electing one's own subjects, all this generates and shapes an understanding in the students that they may compose their own curricula and leave out the more difficult subjects. The people responsible for curricula management are influenced and it is suggested that their curricula graphics related subjects are not necessary at all. For example, in Tallinn TTK University of Applied Sciences, in professional higher education curriculum of logistics, the subject Descriptive Geometry was deleted from the science module. In addition, the subject has not been inserted into the professional higher education curriculum of Production Management. The result is

meagre knowledge and skills Engineering Graphics and in most cases almost non-existent ability to read drawings because Descriptive Geometry is a prerequisite to the acquisition of Engineering Graphics. The volume of fundamental subjects is decreased, making it more difficult for the students to comprehend and acquire specialist subjects. This causes a chain reaction – students start to take academic leaves and drop their studies because they are not able to acquire the specialty subjects.

Educators, who have studied the more well-known cognitive taxonomies of Bloom's taxonomy, know that the more complex subjects' acquisition is structured as a hierarchical structure. The preceding categories have to be attained in order to achieve higher-level thinking. Thus, first comes Descriptive Geometry, then Engineering Graphics, then Theoretical Mechanics, Strength of Materials and CAD/CAM Systems. Understanding and comprehension is impossible without knowing the issue, and implementation is impossible without understanding. Figuratively speaking, it would be the same as to read a text in a foreign language without knowing the words, or only understanding some of the words. Unfortunately, the majority of curriculum developers do not have pedagogical education and this, consequently, leads to the fundamental errors in the composition of curricula.

Second, the university's administrative staff and the enrolment committee is interested in a large number of high-quality student candidates and, consequently, draw a pretty picture of the student life in a variety of their events, campaigns and presentations. As a result, new students will get the impression that student life is an interesting and cool pastime. Students feel that professional and cool faculty must teach in such a way, using such methods that students themselves do not need to work hard. This creates the valid expectation of the students that studying at the university is cool and entertaining, which causes cognitive dissonance.

As the parental control lessens after students enrol at the university and some of the students do not accurately grasp the idea of academic freedom, then everything seems all fun and games during the first semester, studying seems to go like clockwork, until the first examinations and assessments come. Now it turns out that some of the first year students' outcomes are none existent or scarce, and this causes the search for explanations and culprits. By the way, the students are right, because there is nothing said about independent work, motivated learning attitude, the need to focus on subject matter at those introductory events. Gullible students experience a discomfort at their heart, which is called **cognitive dissonance**<sup>1</sup> [1]. To escape the uncomfortable feeling students start

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<sup>1</sup> In psychology, **cognitive dissonance** is the mental stress (discomfort) experienced by a person who simultaneously holds two or more contradictory beliefs, ideas, or values; when performing an action that contradicts existing beliefs, ideas, or values; or when confronted with new information that contradicts existing beliefs, ideas, and values.

Leon Festinger's 1957 theory of cognitive dissonance focuses on how human beings strive for internal consistency. A person who experiences inconsistency tends to become psychologically

to justify themselves, blame the teachers, and look for ways to solve the problem. They go to the Dean's office and try to convince the administrative staff that the labour-intensive, accuracy and precision demanding subjects are unnecessary in their specialty, and should be deleted from the curriculum altogether.

To sum up, I would like to draw the attention of the administrative staff responsible for the enrolment of students that the core of their activities in introducing university to students should be to stress the need for serious and continuous learning. One has to study systematically and thoroughly throughout the semester. Pupils should know they will face new studies environment, where teachers will not check their progress as they did in high school. Higher education presupposes finding inner motivation and applying it. Curricula should be designed strictly on the bases of educational psychological research. Giving pupils the adequate information described above will avoid the emergence of mental discomfort and loss of motivation for learning, which can lead to discontinuation of studies and drop in self-esteem. The student might break as a person, which is even worse.

There is one magical set of words that can make a student or any discussion partner averse. If someone asks for a clarification about an incomprehensible problem, you should never reply that this problem is so simple, because obviously it is very complicated for the person asking the question. **Cognitive dissonance**<sup>1</sup> arises from the fact that you begin with a contradictory statement, because the issue is complicated for the student. Dissonance is stronger and fiercer, the older, more experienced, and inflexible the conversation partner is. The last statement is based on personal experience, for which I have received confirmation from psychological literature.

#### **References:**

- [1] [https://en.wikipedia.org/wiki/Cognitive\\_dissonance](https://en.wikipedia.org/wiki/Cognitive_dissonance) (used 22.03.2017)

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uncomfortable, and so is motivated to try to reduce the cognitive dissonance occurring, and actively avoids situations and information likely to increase the psychological discomfort.