From Motivation of Achievement to Understanding—The Way to Success in Education of Information Society

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Abstract. The article discusses the necessity for revising the teaching process as dictated by the peculiarities of information society. The interrelation between an approach to education (competence-based) and the content of understanding (subject-oriented) that emerged in the contest of information society has been discovered. The way to success can be paved by organizing a continuous competition among schoolchildren in order to motivate them to achieve success while this motivation consequently results in understanding. A case of teaching Physics serves as grounds for discussion. The conclusion is made that success correlates to interpreting the phenomenon of subject-oriented understanding.

Introduction

Informational oversaturation is typical of the modern society that undoubtedly influences all spheres of human life, education included. The education has not necessarily become worse, though it has changed dramatically. Young people feel absolutely comfortable in this information whirlpool. Their consciousness efficiently filters gigabytes of information and registers only those they are interested in. Nevertheless, the communication channel that carries semantic information to the consciousness has a capacity between 10 and 100 bytes per second [1]. This data was published in the middle of the XX century and is unlikely to have changed since then. A carrying capacity of consciousness is the maximal speed of transmitting and processing information. The bigger a carrying capacity of a communication channel is, the more information it can transmit per time unit [2]. The rate of electrochemical reactions performed by the brain is defined by the human physiology and remains unchanged on average. Therefore, the volume of information incoming into the consciousness is limited depending on its carrying capacity.

Nowadays, education faces a priority task of organizing students’ work that would make them interested in the academic information and consequently capable of selecting it from the huge volume and registering it with their consciousness. Previously it was only necessary to transmit the academic information.

Hence, the contemporary education methods have to focus on forming the interest or motivation in studying. However, the process of motivating people to study information is heavily affected by its understanding. The present article is devoted to the phenomenon of understanding and our suggestions in encouraging schoolchildren’s interest in studying Physics through competition.

The Phenomenon of Understanding

The problem of understanding is a key issue that is relevant for both sciences and humanities. Modern science studies different aspects of this problem (cognitive, educational, existential, etc.). Classical philosophy defines the problem of understanding as a problem of knowledge about knowledge. Understanding is obviously essential for cognition that emerges as a result of a whole combination of academic knowledge about the cognizable knowledge. According to A.A. Selitskaya, “… different levels of understanding are created by descriptions, explanations and predictions. All cognitive operations have to rely on understanding”.

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The concept of understanding has been studied and defined by researchers in different ways. However, the definitions can be divided into two groups depending on the following feature – absence or presence of the subject in the content of the understanding concept. Table 1 shows the definitions classified according to this factor.

Table 1. Definition groups of the understanding concept.

| №  | Group 1 (no subject in the content of the understanding concept)                                                                 | Authors                   |
|----|---------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| 1  | - a moment of obtaining the knowledge about the reality                                                                           | V.A. Lectorski [3]        |
| 2  | - a procedure of reconstructing the questions answered by the knowledge                                                         | L.P. Doblaev [4]          |
| 3  | - intuitive comprehension of the whole before comprehending its parts                                                            | E.V. Bakeeva [5]          |
| 4  | - intersubject way of thinking                                                                                                  | Yu.M. Shilkov [7]         |
| 5  | - subject’s comprehension and projection into the world of thoughts and emotions of other people                                 | W. Dilthey [9]            |
| 6  | Subject “creates” the truth by transforming the object, itself and their knowledge about the world and the object                 | L.A. Mikeshina [6]        |
| 7  | Understanding emerges when in the process of cognition the subject sets a system of connections between the objects, phenomena, and events, a system that shows an integral picture and image filled with meaning; understanding is a bridge that connects cognition and communication. | A.A. Brudny [8]           |

The first group includes the definitions that mention no subject: the first and the third definitions in Table 1. Understanding is defined as a moment [3] or a process—procedure, obtaining of knowledge [4, 5].

The second group includes the definitions that contain a subject. For example, L.A. Mikeshina [6] defines the concept of understanding through the relations between the subject and the cognizable object. The same approach is taken by Yu.M. Shilkov [7], A.A. Brudny [8] and V. Dilthey [9].

The authors of the article adhere to the opinion that the second, subject-oriented approach to defining this phenomenon could appear after the problem of understanding in the epistemological context attracted the attention of psychologists. In 1958, S.L. Rubinstein wrote that the epistemological analysis of understanding provides for an incomplete description of the subjective image since it fails to consider the psychological features of those who cognize [10]. Therefore, changes in the epistemological approach to the phenomenon of understanding that involve a subject into the process of understanding objectively emerged with the development of psychology.

Different theories and research areas of social and humanitarian studies are objectively connected. This connection is defined by the worldview which is typical of the given period of social development. Despite the isolation of research in education and theory of cognition, their main concepts correlate to the laws of social development. The Russian pedagogy of the XX century focused the theory of education on the teaching problems that emerged during transmission of knowledge, skills and abilities to students. In the context of requirements to educational results, the subject (student) was not taken into consideration. Pedagogy related the degree of understanding to the level of formed knowledge, skills and abilities. This approach was established by official state educational standards of the time.

The middle of the XX century brought another approach to the phenomenon of understanding in epistemology after the category of subject was introduced into semantics. Changes of the main concept of epistemology were necessarily supposed to trigger a reaction in all social humanities.

Dealing with the methods and technologies of teaching Physics, the authors of the article are interested in the response of pedagogical sciences. This response in the Russian educational area led to the introduction of a new category of educational results in 2000s—competence and competency. The following similarity can be traced: the previous teaching results such as knowledge, skills and abilities were related not to the subject, but to the average object of teaching. A new competence-based approach to the teaching results is aimed at the subject of teaching who possesses certain abilities for specific activities and is competent in the related area of knowledge.
The subject context of competencies is obvious – it exists in the definitions of competencies. For example, in Wikipedia a professional competency is defined as ability for successful actions based on practical experience, skills and knowledge while addressing professional tasks [11]; the Russian Standard of Higher Professional Education defines the competency as a pre-determined social requirement (a norm) to the training of students or applicants [12]. All definitions focus the content of the phenomenon concept on the subject. Therefore, a conclusion can be made that the definitions of the understanding concept that do not rely on the subject-oriented phenomenon of understanding are disconnected both from psychology and pedagogy. A high degree of interdisciplinary connections and hence the significance of understanding the concept of understanding in social humanities determines the necessity for adjusting its definition to the modern concepts of epistemology, psychology and pedagogy.

Studying the correct content of the understanding concept could be very beneficial for teachers, especially for teachers of Physics who sometimes fail to ensure understanding of the academic material by all students due to the complicacy of the academic subject.

**Competition-based Motivation to Study Physics**

A high school course of Physics contains a complicated description of laws, theories and models that are necessary to know in order to explain the natural phenomena. This complicacy is predetermined by extensive use of abstractions. Though abstractions are perceived easily in the young age, a pupil has to apply an intellectual effort to fill the abstract image with meaning. A teacher’s help is critical at this stage. Means and forms of activities at Physics lessons have to facilitate achievement of the goal, i.e. help the schoolchildren understand the semantics of abstraction of the Physics course. In our opinion, the physics lessons have to be structured in the way that would trigger the motivation for studying Physics. Motivation for achieving success was described by H. Murray as a consistent need for achieving a result. In his interpretation, this motivational feature reveals itself as a striving for “doing something fast and well and achieving the level in an activity”. G. McClellan, a famous American psychologist shows that a motivation for achievement is predetermined by the competitive activity and is a socially-acquired mental skill mostly developed in childhood and in the course of education. “A subject can fail in achieving the goal, but the involvement itself in such a competition is a sufficient reason for considering the goal dictated by the motivation for achievement [13]. It can be added that the motivation for avoiding a failure which is outwardly similar to the motivation for achievement is virtually inactive during competition.

Meanwhile, it is obvious that organization of competitions at Physics lessons will bring results on condition of preliminary-formed groups with a leader in each of them. In the early 1900s, A.S. Makarenko emphasized a positive influence of an older child’s authority on a group of teenagers. A teenage group usually has a typical reference leader who has the biggest authority and popularity. The influence of this person is defined by his interests, pastimes, appearance, speech and other personal qualities. For instance, N.B. Rozhinskaya [14] says that a reference leader is “a person perceived by a teenage group as significant due to the combination of individual personality features; he possesses a value-based status and encourages submission, imitation and emulation of him as a model of appearance, actions and moral standards”. Our research [15] has shown that efficient management of competition in a class is possible if this class has reference leaders who follow high moral standards. At the same time the behavior or schoolchildren is heavily influenced by spontaneously-emerging leaders. Sometimes these leaders possess high moral standards thus facilitating the task of managing the class. However, opposite situations occur when a class is led by an individual with low moral standards and becomes unmanageable. It is important to have a proper leader at Physics lessons, since the motivation for studying this subject can be triggered by overcoming laziness, showing industry and making intellectual efforts. A strong leader, who strives to reach an academic goal, can trigger the aspiration for studying among his classmates. Therefore, the problem of finding and training leaders with high moral standards is undoubtedly very important for the society.

The degree of moral standards can be determined with folklore reflected in proverbs. Proverbs can describe both moral and immoral situations. For example, a person who accepts the proverb “Poverty
is no vice” shows noble qualities. Poverty in no shame for this person. These qualities can be also attributed to the person who does not accept the situation “Not my circus, not my monkeys” – it is typical of those who have a noble life stance and are not afraid to express his opinion. Accepting or denying different situations reflected in proverbs can be related to pupils’ moral standards. We studied the moral standards of schoolchildren with our methodology of situational matrix described in the articles [16-18]. The main stages of forming the groups for competition are as follows: 1) compiling the group “Extra” by including the pupils with high moral standards, 2) conducting measures on developing the leadership qualities among the members of Extra group, 3) using a sociometric polling, dividing the class into teams that will compete with each other; 2-3 pupils from the Extra group are included into each group and granted the leadership authority, 4) organizing competition at Physics lessons—in the form of business role play or conference. Friend support is considered the major value in the group. It is encouraged by the teacher with the help of class leaders and allows the pupils to apply intellectual efforts and develop interest in the academic material.

Summary
Therefore, by creating the motivation for achievement among schoolchildren, competition increases their self-assurance, teaches them to overcome nervousness, increases the friend support among the classmates and, most importantly, the process of competition involves training of intellectual abilities, makes the tasks of Physics more comprehensible and removes the barrier of understanding from abstractions in the course of Physics. All these factors encourage interest in studying Physics and cognizing the world around us. It is important to involve every pupil, even not very successful ones, into the competition. The conditions are created to remove the barrier of unwillingness to understand complicated descriptions of natural laws thus providing for the major step towards understanding the processes studied in the course of Physics. As it has already been mentioned in [18], this approach to teaching is very efficient. It leads to breakthroughs in understanding of physical principles among those pupils whose level of understanding Physics would be much lower under usual conditions. The degree of creativity among successful pupils increases dramatically due to the necessity to support the weak members of their teams. An individual subject understands the topics through a team activity in competition. These pedagogical results prove the advantage of defining the subject-oriented phenomenon of understanding.

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