

Learning Motivation of High School Students with Different Educational Success in the Subject of Chemistry

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Abstract

The article presents the results of research aimed at finding out the structure of learning motivation in the subject of Chemistry among students in the 2nd and 3rd year of high school. The students had achieved differing levels of academic success. The problem of the relationship between school grades and levels of individual types of learning motivation are considered

Introduction to the topic

Every teacher should be aware that the development of motivation setup and self-regulation of the students is one of the main objectives for its action. Stimulating the need to explore, creating interest in the world around, which is the driving force behind the development of one's personality and active attitude toward life, is certainly not less important pedagogical objective of the teacher than mediating facts. Stimulating students' motivation based on the results of several authors is a weakness especially for science teachers. Student's relationship to the subject is considered a sign of motivation. Subject popularity research shows that, particularly, physics and chemistry conclude the long "popularity list" of school subjects.

Given the importance of science for human life, causes and change possibilities for this unsatisfactory situation must be found. Many point to relatively large range of science knowledge and reducing number of class hours at the expense of laboratory and field work. This often leads to the use of monologue teaching methods when students remain in a position of passive recipients of the knowledge and little apply meaningful learning and logical thinking. Students consider chemistry and physics, in particular, as difficult subjects that do not relate much with everyday life. Therefore the opportunity to solve interesting tasks and problems, and understand their relevance to personal lives and their own perspective belong to the important motivating factors.

Also, verification of students' learning frequently lies in the mechanical reproduction of acquired knowledge and developed skills. Given the difficulty of these subjects, over-sized curriculum, and importance of the grades for further studies of the students, become these subjects discouraging for some students. The student learns then under the pressure of fear of failure and its consequences, only upon accepting his student role as a duty, or because he does not want to lose his image of capable successful person in the eyes of the classmates or the teacher. Student motivated by these factors, does not learn and show an effort to spontaneously adopt a curriculum, but must be externally driven by the consequences of his behavior. However, the quality of teaching is the most intensely influenced by the intrinsic motivation, characterized by self-determined behavior. It does not require external stimulation and is stable over time.

Self-interest, curiosity and desire to explore all characterize this type of motivation, motivation which enables continuous learning that gradually exceeds the period of schooling and becomes a lifelong "equipment" of the person. Intrinsic motivation is also characteristic for those who use in-depth approach to learning and are oriented to the value of what they learn. People who are intrinsically motivated, with an internal localization of control are largely characterized by greater self-confidence and positive self-conception. School evaluation is one of the factors involved in the formation of student ideas about himself, about his skills. It may affect the nature of student learning motivation connected with an update of different needs, preferences of his learning styles and strategies.

The results of school evaluation also effect the nature of interactions between teachers and individual students. For some teachers noncritical simplistic view of the students is typical. Their evaluation is marked by perceptual errors, which are also reflected in their relationships with the students (eg, first impression or halo effect, stereotyping ...) "Once induced perception attitude orientation of the teacher to the student very often

acts as a regulator of such interactions that lead to validating what is understood by the perception of attitude orientation. It leads to the predominance of situations in which the student can not behave otherwise as to be understood by a teacher as an endorsement of his perception of attitude orientation".

Objectives

In the research the focus was on the issues of learning motivation of students within the content of learning chemistry, i.e. the subject which is considered relatively little popular by the students. Given the importance of knowledge of chemistry in everyday life and for its use in many professions, it is necessary to look for ways to make its teaching more effective. This paper presents selected results of a wider-ranging research study that sought to map out the issue. Specifically, it reports the survey results of the structure learning motivation among high school students with different achievements in the subject of chemistry. In this context, information on the relationship between school grades in chemistry and different types of learning motivation is listed as well.

The used methods

To identify learning motivation of the students in the subject of chemistry, a Preferentation motivational questionnaire of the author V. Hrabal was used. This research tool allows identifying the hierarchy of motivational stimuli of the teaching activities.

It distinguishes 6 types of motivation:

- I. positive social motivation (student learns for a good relationship from the teacher),**
- II. cognitive motivation (student learns for his interest in it),**
- III. moral (student learns because he finds it his duty),**
- IV. fear of failure, consequences (student learns because he is afraid of failure),**
- V. desire to excel and prestige (student learns because he desires to stand out above the others),**
- VI. good feeling from a good performance (student learns because he has a good feeling when he learns something well).**

The questionnaire consists of items - statements that represent the types of learning motivation. Individual items are always presented in pairs. Number of pairs covers all combinations of motivation types. Students' task was to select and mark in each pair that reason, the stimulus for learning, which counts more for the subject of chemistry. After evaluation of the responses six normative scaled scores of these types of learning motivation with a range of 0-5 and a total sum of 15 points were created for each student. The decision to choose as a research tool the questionnaire of V. Hrabal was influenced by the possibility of comparing the obtained results with the findings of other studies. Another source of information, research data, was collected from teachers. The role of the teacher was to mark predominant grade for every chemistry student.

Research sample and conducting of the research

Research was conducted on a sample of students from grades 2 and 3 of high school and their chemistry teachers. Specifically, the investigation was attended by 230 students (90 boys, 140 girls) from 9 classes of three high schools in Bratislava and two high schools in Malacky. The students were taught by 8 chemistry teachers.

Results

Based on the results found out through the preferential questionnaire and data of teachers' student ratings was gained an overview of the representation of different types of learning motivation among students with different school success. Besides those students who are marked with grade 5 (Failed) in Chemistry, achievement motivation is the most common one, characterized by a good feeling from performance. For the "F" students this type of motivation appears on the 3rd place. The group of "A students" (23 boys = 25.6%, 43 girls = 30.7%) is relatively strongly represented by the cognitive motivation, which placed as second in order only for these students. Nearby value, however, was for them reached also by the moral motivation. The result indicates that even for them relatively strong stimulus for learning chemistry is also the pressure of the sense of duty. For these students follows positive social motivation, and as the last type is the fear of consequences. As with all other groups of students the last spot belongs to the desire to excel and prestige.

For "B" and "C" students the samples are characterized by high intensity of moral motivation, which values are close to performance motivation, the first in order. For the "B students" (22 boys = 24.4%, 48 girls = 34.3%) in the third place, with a certain distance, ranked cognitive motivation, and a similar intensity had learning motivated by the fear of consequences. It is followed by the positive social motivation. In the third place for the "C students" (29 boys = 32.2% 36 girls = 25.7%) ranked in the hierarchy of motives relatively strong fear of consequences. After it follow with the same marking cognitive and positive social motivation. For the chemistry "D students" (12 boys = 13.3%, 11 girls = 7.9%) is characteristic as the second most intense learning motive a fear, fear of consequences, followed by learning with the sense of pressure of duty. Only in this performance group cognitive motivation ranked second lowest after positive social motivation. Brightest motive for learning chemistry leading the "F students" (4 boys = 4.4% , 2 girls = 1.4%) was the sense of duty followed by fear of consequence. As already mentioned earlier, a good sense of good performance is in order on the third place of motivational tendency of the "F students". After is placed, with a certain distance, cognitive motivation and on the second last place in order is positive social motivation. Latest in order is motivation coupled with the need to stand out. In this group it is the lowest one of the whole sample, reaching for that group of students the lowest intensity from the whole sample (note, given the very small number of students from this performance group, stated data have only low informative value.) In this context, it is considered important to note that the girls from our file reached in chemistry significantly better grades than boys.

It can be concluded that the nature of school activities, structure of the learning tasks, emphasis on verbalisation, requirements for obedience, behavior control, attention, and willingness to submit to the leadership, are better suited to the feminine type of behavior. Fulfilling these requirements is also indirectly a condition of academic success. The fact that girls are better rated at schools is also represented by the international research results of educating fifteen year old young people PISA. Although boys achieved in mathematic tests significantly better score which proves their greater ability to apply knowledge from the field of science, the school evaluation was not in agreement. Among mathematics A and B students were more girls than boys, while in the case of C and D students the situation was reversed (PISA SK, 2003). Kusák (2003) reported that for the boys the factor of interest is involved more significantly in the success when compared to the girls.

Another goal of the research was to investigate the closeness of the relationship between the evaluation of students in chemistry and the different types of motivation, which represent the different needs of students encouraging their learning. The obtained values of correlation between the predominant grade of high school students in chemistry and intensity of each type of learning motivation in this subject suggest that in some cases there is a relationship between these variables. Specifically, a positive correlation was found out between the classification and the intensity of fear of consequences of students. It is understandable that a student who experiences often failures, defaulted in such situations will experience fear and will be motivated to avoid expected negative consequences.

It is necessary to understand that such motivation tuning a priori worsens the prospects of success. Motivation of fear paralyzes students' potentials, redirects them from focusing on academic success and often leads to inappropriate fixation of teaching strategies or behavior, which is seen as a chance to reduce the likelihood of school failure or to mitigate its negative effects (memorizing without understanding, cheating, school ditching ...).

The solution is to use a wide range of possibilities for formative evaluation and consideration of the individual characteristics of students in learning. The primary solution is particularly profound reflection of the teachers on basic meaning of evaluation and on its criteria.

Another significant relationship is expressed by the value of the correlation between school grades in chemistry and cognitive motivation. A negative correlation indicates that for the students with better school performance the intensity of cognitive motivation also increases. Students' interest in issues of natural science, which was created in the past at or outside school, and which often contributes to a higher level of knowledge that the student already has, tends to base his more frequent successes. But even good grades, which are primarily the result of extrinsic motivation, may secondarily cause the student's interest in these science fields. Tightness of the relationship between the grade and the type of motivation is in both significant cases higher for girls.

Also this finding supports the earlier assumption that a greater proportion of girls' cognitive motivation for learning chemistry may be due to their higher academic success (more positive evaluation), thus extrinsic

motivation, which gradually changes to intrinsic motivation. Teachers should be aware of the importance of the "art" of rating, even with regard to the gender specifics. Namely boys respond to partial failures in school in a more destructive way, attaching more importance to failure and generalize it more than girls. Thoughtless approach of the teacher to students' evaluation reduces their chance to shape more effective intrinsic motivation.

Conclusions

The results indicate a possible relationship between motivational success of the students and their academic success. In specific, higher level of cognitive motivation was found for students successful at academics and more intense worries from the consequences as the learning motive for the less successful students. Teachers should be aware of great motivational importance of academic evaluation and sensibly use various ways, especially for formative evaluation. In school practice, the teachers are often limited to summative (final) evaluation which aims only at measuring student performance. Formative evaluation is recommended, providing the students with evaluation information in time, when they can still change their performance and allows them to look for more successful paths to the goal. Therefore there is a higher chance that students will understand the evaluation as a help instead of a judgment, and thus it can positively influence motivation more or less regardless the outcome of the evaluation.

Its main task is to increase the efficiency of learning of students and their complex influence on the spirit of educational objectives. Little interest in some subjects, including chemistry, is related to the difficulty and predominant character of the teaching. It often tends to have a direct, frontal character that teachers elect largely under pressure from the oversized curriculum. Several teachers significantly degrade laboratory and other practical activities of students.

Verification of the results not rarely lies in the mechanical reproduction of acquired knowledge and developed skills. Often used surface learning strategies by the students are also linked with the fear of failure given the uncertainty of not understanding the curriculum. Involving problem solving and creative tasks as well as nowadays still underused conceptual tasks with visualisations and problem situations can contribute to better management of the learning content and stimulation of students' cognitive motivation in chemistry. They aim to detect the depth of concepts understanding and relations among them. The instructions contain elements of uncertainty and freedom which increases tasks' attractiveness. Visualisations and nonverbal expressing of the information used in the tasks offer the opportunity to think about various alternatives which in a consequence increase the chances of stimulating the cognitive motivation of the students.

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