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What is the motivation difference between university students and high school students?

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Abstract

Recent years, it has been seen that affective variables are needed to be considered for better science learning. One of the valuable affective variables is the motivation. Motivation itself is an important factor that increases students' achievement. Because of this finding, in this study motivation of students in high school and in universities are investigated to compare how the students' motivation is changing when they choose a science area for studying in the universities. It was found that university students are more motivated to science when compared to high school students.

Keywords: Science education; motivation; university students; high school students; motivation to science.

1. Introduction

For many years, the researchers and philosophers are trying to find the most effective strategies to make learning better. For this reason, different learning and teaching strategies had been developed. After the middle of 18th century, Bloom's taxonomy has become the key classification of educational objectives for better learning with its three domains; cognitive, affective and psychomotor. This classification make the educational researchers realize that it is not enough to decide the best teaching method or the most effective teaching strategy alone; instead; students' feelings, interests, attributions, ideas, emotions, goals are also very important for giving meaning to what is being taught to them. (Gardner 1999; Goleman 1996; Morgan 2006). This was the time, "affective domain" found its place in educational area. After realizing the significance of affective domain, educational researchers made studies accordingly, concluding that for better learning to occur students should be activated by their affective domains next to cognitive domain and psychological domain. This acceptance of the researchers opened a new research area which aimed to define the components of affective domain.

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For example, Brown (1994) defined affective domain as "the emotional side of human behaviour." (p. 135) that simply includes all of the emotions that a human being shows can easily be put under this domain or according to the study made by Bloom, Krathwhol & Masia (1964) the affective domain includes attitudes, emotions and also five sub-categories in this domain that are the receiving phenomena; responding to phenomena; valuing; organizing values and internalizing values.

Under the light of many researchers' findings, there are some variables that proved to be very effective in student's learning that are under affective domain. These are motivation, attitudes, self-efficacy and anxiety (Akbaş & Kan, 2006). All this constructs have their unique importance in students' learning. But one of them occupies more space in educational researches, motivation of the students. As being the centre of educators, motivation has been defined from many different views which results it to have many components and constructs. According to Brown (1994), motivation is an inner drive, impulse, emotion or desire that moves. According to Pintrich & Schunk (2002) motivation is "a process for goal-directed activity that is instigated and sustained" (p.5). These definitions of the researchers showed that the important motivational constructs include intrinsic and extrinsic motivation, goal orientation, self-determination, self-efficacy, and assessment anxiety. According to Reeve, Hamm & Nix (2003), when students believe they have some degree of control over their learning, their motivation is increased. For Cassady & Johnson, (2002), a high level of assessment anxiety should prevent students from being. According to Pintrich & Schunk (2002), intrinsic motivation refers to motivation to engage in an activity for its own sake. People who are intrinsically motivated work on tasks because they find them enjoyable and extrinsic motivation is defined as the motivation to engage in an activity as a means to an end. According to Cavallo, Rozman, Blinkenstaff, & Walker (2003), goal orientation can be linked to intrinsic and extrinsic motivation since students with learning goals tend to be intrinsically motivated who try to learn and understand the related content because they want to learn the contents, whereas students with performance goals tend to be extrinsically motivated, trying to get the highest grades and impress their instructors. Reeve, Hamm, & Nix (2003) defined self-determination as the ability to have choices and some degree of control in what we do and how we do it. According to Glynn & Koballa (2005) students that have the possibility to determine what their educational activities will gain more benefit from these activities (Glynn & Koballa, 2005). Self-efficacy is defined by Bandura (1997) as "beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). Anxiety is state of unpleasant emotion or a feeling of apprehension and tension, in reaction to stressful situation (Hembree, 1990). Seymour (1992) concludes that from time to time every students experience anxiety and if the anxiety they experience is at moderate level, it is good since moderate level anxiety helps the students become more motivated to learning (Cassady & Johnson, 2002). All this constructs can be put under motivation because they are all connected to motivation as it can be seen from their definitions.

Since motivation and its constructs are the keys for better and meaningful learning, it is impossible to exclude it from science learning. In recent years, according to the literature review, it is seen that science educators are making studies in which they assess students' motivation. A study made by Britner (2008) aimed to examine self-efficacy and other motivation variables among high school science students; Nieswandt & Shanahan (2007) examined the motivational structure of a group of male students at 11th grade. A part of Nolen's (2003) study also examined high school students' motivation. Glynn, Taasoobshirazi & Brickman (2006), conducted their study to test a theoretical model of nonscience majors' motivation to learn science in a large-enrollment college science course.

Even if there are many studies on motivation in science learning, some of which are conducted to high-school students, and some to university students, there are very few studies that tried to make a comparison between the motivation levels of students in high school and students in universities. But it is important to investigate how the students' motivation is changing when students choose a science area for studying in the universities. For this reason, the purpose of this study is to fulfil this gap especially for Turkey. In addition to this, since this study is done in Turkey, the Turkish educators should benefit from the study results and they should try to improve their teaching strategies and methods for having more motivated students.

2. Method

In this study we have focused on the motivation of the students in high school and in universities to compare how the students' motivation is changing when they choose a science area for studying in the universities. To compare

the motivation levels of students we had chosen the Science Motivation Questionnaire (SMQ) instrument that is developed by Glynn & Koballa in 2005.

Our purpose caused us to apply purposive sampling. First of all, our sample was chosen according to the language of our instrument. Since SMQ is developed in English, we had chosen our sample from schools in which medium of instruction is English in Turkey. In addition, since our aim is to compare university students with high school students, we had chosen our high school students in relation to university students' properties. For this reason, the school distributions of the university students were examined. According to the data from OSYM (2009), it is seen that nearly eighty percent of the students are coming from different types of high schools which are science high school, Anatolian high school and Anatolian teacher high school. For this reason 3 high schools were chosen to study in which one of them is a science high school, one is an Anatolian high school and the other is an anatolian teacher high school.

The second thing done at the beginning of the study was deciding on the appropriate sample size according to the accessible population of the study which was all the students in the selected university that are in science majors. With a confidence level 95%, 278 university students were found to be appropriate according to the number of students in the universities and the numbers of high school students were also selected to be at least 278. Even if this was the case, 310 high school and 310 university students were decided to be studied for preventing the subject loss during the study. As it was expected, 14 high school students and 3 university students were not in the classes when this survey was conducted. After data collection, the non-responded items were checked. There were 2 questionnaires in the high schools and 5 in the university that include non-responded items. This questionnaires were deleted from the data since they should cause mortality threat in our study.

The original English form of SMQ was applied in a public university and three high schools. The questionnaire which has 30 items includes statements about science motivation. These statements are rated on a five point likert scale from strongly agree (5) to strongly disagree (1) and maximum score on each component is 25 and the minimum is 5 and total interpretation of the results for motivation was suggested to be used as 120-150 motivated "often to always" (high motivation), 90-119 motivated "sometimes to often" (moderate motivation), 60-89 motivated "rarely to sometimes" (low motivation) and 30-59 motivated "never to rarely" (very low motivation).

To determine relationship among statements and how students view this relationship, Glynn and Koballa run exploratory factor analysis. Six dimensions were identified and categorized by Glynn and Koballa (2009) which are intrinsic motivation to science learning (items 1,16,22,27,30), extrinsic motivation to science learning (items 3,7,10,15,17), personal relevance of learning science to personal goals (goal-orientation; items 2,11,19,23,25), self-determination (responsibility) for learning (items 5,8,9,20,26), science self-efficacy (confidence) in learning science(items 12,21,24,28,29), and anxiety about science assessment (items 4,6,13,14,18). This questionnaire explains the way to discuss the results of the data analyzed by submitting each component items under each related component. It also tells to submit all the components' total scores for finding the total score of motivation for each student. So the collected data will be analyzed according to this submitted data for a general overlook on the students' motivation. To provide evidence of the reliability of the SMQ, in terms of the internal consistency of its 30 items, a Cronbach coefficient alpha was computed and it was found to be relatively high ($\alpha = 0.93$) by Glynn & Koballa (2005).

This study was conducted during a semester by 302 university students and 294 high school students who selected science area in their schools. When we compare university students and high school students' motivation levels we assume that they are derived from same population. Since most of university students were derived from similar high schools. In our study we also used exploratory factor analysis to provide evidence to construct validity by conceptualizing students' motivation to learn science in terms of these six dimensions and when we found a close categorization to the suggested one. The collected data was then analyzed by descriptive statistics.

3. Results

In the study, students' scores on the SMQ were analyzed by utilizing the descriptive statistics. Statistical analyses were performed at 0.05 significance level using SPSS. Under the light of this information, the data obtained from the public high school and university students of Ankara, Turkey were put into factor analysis to decide if the constructs defined by Koballa and Glynn (2005) is valid for the data collected in another country for both university and high schools. From the results of factor analysis, it is seen that most of the items are loaded to their actual

factors suggested by Koballa and Glynn (2005). The KMO and Barlett's Test is found as 0.844 for the data collected from university and as 0.881 for the data collected from high schools. The different loadings were happened in the university data are 26th item is loaded on the extrinsic motivation that should be under goal orientation, 8th item is loaded on intrinsic motivation that should be under self-determination, and 12th data loaded on extrinsic motivation that should be under self-efficacy. The different loadings were happened in the high school data are 12th and 29th items loaded on extrinsic motivation that should be under self-efficacy, 14th item loaded on extrinsic motivation that should be under anxiety. The loading of this three should be because of students' understanding of the questions differently than what they suppose to be. In addition to this, from our point of view, these loadings are not so wrong and can be acceptable. To give an example, for 12th item, which is "I expect to do as well as or better than other students in science course" can be accepted to be loaded on extrinsic motivation if students are studying harder to get higher grades or the same grades because they give importance to get a high grade from science courses. The same reason should be applicable for each different loading occurred in the factor analysis. The six components were then measured by collecting the relevant items under each component as suggested. In Table 1, the means of high school students' scores are shown according to each component of SMQ and the total motivation score found as 96.8 from the collected data, which means the students are moderately motivated on science.

Table 1: Means and standard deviations of each component and motivation for high school students

	i trinsic	**e trinsic**	**g al orien ation**	**selfdeter ination**	**self fficacy**	**anxiety**	**mo vation**
N alid	294	294	2 4	294	294	294	94
Mean	16,513	18,078	1 1122	16,2959	16,' 357	15,418	6,7959
Std. D viation	4,5174	4,9795	4, 5505	4,25920	4,5' 158	6,5037	8,60491

In Table 2, the means of university students' scores are given for each component as suggested by SMQ and the mean of the motivation score found as 120.1 from the collected data, which means the students are highly motivated on science.

Table 2: Means and standard deviations of each component and motivation for university students

	i trinsic	**e trinsic**	**goalorier ation**	**selfdetermi ation**	**sel efficacy**	**a xiety**	**mo vation**
N alid	302	302	302	302	30	302	02
Mean	20,62	20,70	19,76	19,97	19 '6	19,28	20,10
Std. De iation	2,128	2,706	2,353	2,784	2,6 4	3,101	1,163

4. Conclusion and Implications

In recent years, many studies presented that motivation plays an important role on learning science (Dalgety, Coll, & Jones, 2003; Zusho, Pintrich, & Coppola, 2003;Yılmaz & Çavaş, 2007). Although motivation has many different aspects, for this research motivation was only handled in terms of levels of schools. In this study it was observed that students' science motivation in the university is higher than students in high schools. However, high school students 'motivation is not very low. They seemed to be moderately motivated to science which can be accepted as a high and surprising result, since teachers are still teaching by traditional methods even if the new curriculum has changed to constructivism and traditional teaching method eliminates the importance of the affective variables, specifically motivation of the students. This result might be because the study was conducted in high schools whose students were selected by higher scores in a selection exam. So, these students should be accepted as already motivated intrinsically and/or extrinsically to science because of their prior experiences, interest, or because they think to win the university exam, they must be good at science courses. In addition to this, university students' seemed to be highly motivated to science. It can be a result of students' positive attitudes towards science when they willingly choose the science area for studying in the universities and also because of their usual success in science courses. The difference between the motivation of university students and high school students can be because of several other reasons like the students that participated in this study might not be giving their answers honestly and

correctly. They may be not giving importance and their attention while answering the questions or they filled the questions according to what they thought the society accepts them to be.

Even if this study tries to compare the motivation of the university and high school students according to the SMQ results, the study has some limitations according to the data collection. This study was conducted in three high schools, only with 294 students and in one university, only with 302 students from different grades and from only one city. This caused some threats to internal validity and generalization. The most frequent threat that the results of the study may be affected is location. Since, the participants in the study were given questionnaire in different types of classroom environments. Some were in university classes and some at different high schools. In addition to this limitation to internal validity, the generalization can be done to only the students' that have closer purposes, goals, interests, etc. to the participants of the study or the schools and universities having closer environment, academic structure or academic achievement. This is a limitation for external validity of the study.

According to these findings, this study provides an overview in high school and university students' motivation in Ankara, Turkey. There aren't many studies done on the motivation of the students in Turkey alone to gain a deeper understanding of students. So, this study may be helpful for the educators, teachers etc. to understand the students' motivation levels that are in high schools with close characteristics to the ones in the study. In addition to this there aren't many studies which compare high school and university students' motivation in the literature. With this study, we tried to make a contribution to related literature. So that this study should make the researchers want to search for the reasons of this difference in students' motivation, make another comparison in different district or replicate the study with a larger population. The student's motivation is related to many components that this study also included. So, some deep analysis should be provided for checking these components effects on the students alone for the future studies. And also the effects of grade, gender, SES should be checked for gaining insight on the students.

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