WESTERN ANATOLIA
JOURNAL OF EDUCATIONAL SCIENCE

http://web.deu.edu.tr/baed
Dokuz Eylul University Institute of Educational Sciences

ISSN 1308 – 8971

Special Issue: Selected papers presented at WCNTSE

WHAT AFFECT HIGH SCHOOL STUDENTS' CHEMISTRY LEARNING?

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Abstract

Students' motivation depends on their interest in the course, efficacy for performing in the course, their intrinsic or extrinsic goal orientations for the course; these kind various variables affect students' motivation to learn the course. Motivated Strategies for Learning Questionnaire (MSLQ), developed by Pintrich, Smith, Garcia, & McKeachie (1991), aims to measure students' motivational orientations and their use of different learning strategies. In this study only motivation section, a 31-item, was used to measure students' goals, value beliefs, efficacy, and their test anxiety for chemistry course. The purpose of this study was to determine what motivational dimensions affect students' chemistry learning. In order to determine student motivation to learn chemistry MSLQ was administered to 115 high school students (53.9 % female and 46.1% male students). The students' chemistry grade was positive statistically significant correlated with merely three out of six dimensions, which are intrinsic goal orientation, task value and self-efficacy. Investigating the nature of student motivation can help teachers and instructors to understand student motivation within a given course since student motivation affect students learning strategies and their course grades.

Keywords: Motivation to learn, chemistry, high school students.

INTRODUCTION

Motivation to learn has increasingly been viewed as an integral part of education, together with cognition, in the last decades. Motivation is defined by Glynn and Koballa (2006) "an internal state that arouses, directs, and sustains students' behavior". Improving student motivation to learn has become an important role for improving classroom teaching and learning. For the cognitive point of learning, it consists of knowledge, skills and abilities. In addition, for motivational point of learning, it includes different motivational dimensions. Students' motivation depends on their interest in the course, efficacy for performing in the course, their intrinsic or extrinsic goal orientations for the course; these kinds various variables affect students' motivation to learn for the related courses.

Studies in science education (Zusho, Pintrich, & Coppalo, 2003; Singh, Granville, & Dika, 2002; Pintrich, Marx, & Boyle, 1993, Schunk, 1991) reveal that motivation to learn positively affects students' performance in learning science. As motivation to learn has an effect on student achievement, it is crucial to investigate what dimensions have more influence on student achievement. Therefore, the purpose of this study was to determine what motivational dimensions affect students' chemistry learning.

Research question

Based on the aforementioned theory, this study is guided by the following research question:

- Which dimension(s) among intrinsic goal orientation, extrinsic goal orientation, task vale, control beliefs about learning, self-efficacy for learning, and test anxiety, affect 11th grade high school students' chemistry learning considering their chemistry course grade?

METHOD

Instrument

Motivated Strategies for Learning Questionnaire (MSLQ), developed by Pintrich, Smith, Garcia, & McKeachie (1991), aims to measure students' motivational orientations and their use of different learning strategies and consists of 81 items on a 7-point Likert scale, from 1 (not at all true of me) to 7 (very true of me). In this study only the motivation section, a 31-item, was used to measure students' goals, value beliefs, efficacy, and their test anxiety for chemistry course. The translated and adapted version of the questionnaire into Turkish is used in this study (Sungur, 2004). The researcher tested the Turkish version of the questionnaire and reasonable fit indices were found via Confirmatory Factor Analysis using LISREL. Sungur (2004) reported the reliability of the each factors were as the following: intrinsic goal orientation 0.73, extrinsic goal orientation 0.54, task value 0.87, control beliefs about learning 0.62, self-efficacy for learning 0.89, and test anxiety 0.62.

Sample

In order to determine student motivation to learn chemistry MSLQ was administered to 115 high school students (53.9 % female and 46.1% male students). The motivation part of MSLQ is composed of 31 items and six dimensions which are intrinsic goal orientation, extrinsic goal orientation, task value, control beliefs about learning, self-efficacy for learning, and test anxiety. Besides the MSLQ items, students were asked to complete their gender and their previous semester chemistry grades. The students mean chemistry grade was 58.30. The administration of the MSLQ was done at one time and last to 20 minutes.

FINDINGS

The relationship between chemistry grades and motivational dimensions was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. The students' chemistry grade was statistically significant correlated with merely three out of six factors was a small, positive correlation between the chemistry grade and intrinsic goal orientation ($r=.24$, $n=115$, p<.005), with high levels of intrinsic goal orientation with high chemistry grades. In addition, there was a small, positive correlation between the chemistry grade and task value (r=.24, n=115, p<.005), with high levels of task value with high chemistry grades. Lastly, there was a medium, positive correlation between the chemistry grade and self-efficacy (r=.38, n=115, p<.005), with high levels of self-efficacy for learning with high chemistry grades.

Table 1. Motivational factors' correlation scores on GPA

Factors	GPA (n = 115)	
	Pearson Correlation	*Significance*
Intrinsic Goal Orientation	.239	.010
Extrinsic Goal Orientation	.078	.407
Task Value	.244	.009
Control Beliefs about Learning	.117	.214
Self-Efficacy	.384	.000
Test Anxiety	-.089	.347

Afterwards determining correlations between motivational dimensions and student achievement, standard multiple regression was conducted to assess the motivational factors measures to predict student achievement. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity. Only three motivational factors (intrinsic goal orientation, task value, and self-efficacy) were used in the analysis since the other three factors (extrinsic goal orientation, control beliefs about learning, and test anxiety) were not significant and had low correlations on student achievement (GPA). The total variance explained by the model as a whole was 15.2%, $F(3,111) = 6.62, p < .001.$ In the model, only the self-efficacy factor was statistically significant, with a higher beta value ($\beta = .39, p < .001$) than the intrinsic goal orientation factor ($\beta = .089, p = .476$) and task value factor ($\beta = -.080, p = .572$).

DISCUSSION

Investigating the nature of student motivation can help teachers and instructors understand student motivation within a given course since student motivation affect students' learning strategies and their course grades, in other words their course achievement. In the light of the findings, it was found that the self-efficacy for learning and performance factor is the most effective factor on student achievement in chemistry. In other words, the students in confidence to perform better in a chemistry course are more motivated to learn chemistry and as an outcome they get higher chemistry grades than the students were not. Intrinsic goal orientation and task value factors also revealed significant correlations on student chemistry grade; however, these factors were not affective as the self-efficacy factor and they did not do statistically significant change in the model. In other words, students who focused on learning and who believed that learning chemistry was useful, important and helpful were more likely to get higher grades in a chemistry course; however, who had more confidence to perform better in a chemistry course and beliefs for accomplishing the chemistry course were more likely to receive higher chemistry grades. Additionally, multiple regression analysis supported the predictability of the three factors and accounted for a total of 15.2% of the variance in the chemistry course grade.

In this study, extrinsic goal orientation, control beliefs about learning, and test anxiety factors did not have statistically significant correlations with a chemistry grade. In other words, the students who were focused on grades or approached chemistry course with an extrinsic goal for learning, who believed that the chemistry course grade was dependent on their own effort, or who reported being anxious about chemistry test did not support significant change in their chemistry course grades.

CONCLUSION

In the light of the results of this study, instructions in chemistry courses besides cognitive structures should also take into students' affective variables account such as intrinsic goal orientation, task value, and especially self-efficacy. The questionnaire results provide instructors with feedback on their course motivation and based on students' responses instructors can use this information in adapting the course to stimulate students' motivation to learn chemistry. Student motivation can change from course to course; therefore, instructions based on different course structures and educational technologies can be constructed considering the motivational dimensions.

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