Modeling the Relationship between Motivation, Learning Approach, and Academic Achievement of Middle School Students in Turkey

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Abstract

This study examines the structural relationship among motivation, deep learning approach, and academic achievement of middle school students in Turkey. Participants were 746 seventh grade and eighth grade students enrolled in public middle schools in Sinop and Ankara, Turkey. Motivated Strategies for Learning Questionnaire, Study Process Questionnaire (R-SPQ-2F) and GPA scores of participants were used in the study. Data were analyzed by Structural Equation Modeling. The results of the study revealed that motivational variables are related with the use of deep learning approach which is related with higher GPA. Path analyses demonstrated that deep learning approach fully mediated the relationship between students' motivational variables and academic achievement. Self-efficacy, task value, and intrinsic goal orientation as the indirect effects through deep learning approach on academic achievement were strong predictors in the model.

Keywords: Academic achievement; motivation; deep learning approach; structural equation modeling

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INTRODUCTION

Academic achievement in preparing students for future is one of the most important indicators for quality of education. Academic achievement is defined as students' attainment of educational goals, to gain knowledge, skills, and competencies of educational outcomes (York, Gibson, & Rankin, 2015). Achieving success requires patience and brings students a lot of satisfaction. Students need to have will and also skill for success (Meece, Blumenfeld, & Hoyle, 1988; Pintrich & De Groot, 1990). Academic achievement mostly is measured with grades and GPA (Grade Point Average) (Aksoy, Aras, Çankaya, & Karakul, 2011; York, Gibson ve Rankin, 2015). But assessment of academic achievement is always a complex process. There are several factors which may affect student achievement such as school-based factors, family-based factors, student-based factors, peer-based factors (Arıcı, 2007; Crosnoe, Johnson, & Elder, 2004; Demirtaş, 2010; Gelbal, 2008; Howie & Pieterson, 2001; Şevik, 2014). These factors are categorized as internal and external factors that contribute student achivement (Jones, 2012; MoNE, 2006; MoNE, 2007).

Many studies have examined the factors that influence academic achievement. A review of the research studies investigating the relationship between school factors and academic achievement indicates that they usually focus on school environment (Aydoğan, 2012), qualifications of teachers (Kavak, Aydın, & Akbaba-Altun, 2007), school management (Leithwood & Jantzi, 2000; Şahin, 2011), school culture (Demirtaş, 2010). The studies about the family effect on student success especially focused on socio-economic factors (Anıl, 2009; Aslan, 2017; Barr, 2015; Coleman, 1998; Gelbal, 2008; McNeal, 1999). And also an important factor influencing achievement is students' characteristics (Buluş, Duru, Balkıs, & Duru, 2011; Özgüngör, 2006). Students' self efficacy, motivation, self respects, learning approaches, intelligence, personal features are good examples of student characteristics. According to Buluş et al. (2011), academic achievement is related with students' abilities to demonstrate their existing characteristics effectively. One of the meta-analysis study with 62 studies focused on the factors affecting student achievement (Sarıer, 2016). It has been found that the most important factors on student achievement are respectively student characteristics, family factors, and school factors. The meta-analysis study revealed that students' self-efficacy, motivation, self-respect, and study habits are impartant factors explaining academic achievement. Similar studies also found that motivation, learning strategies, self-efficacy, personal features (Akyol, Sungur, & Tekkaya, 2010; Buluş, Duru, Balkıs, & Duru, 2011; Nartgün & Çakır, 2014; Pokay & Blumenfeld, 1990; Schunk & Zimmerman, 1994; Zimmerman, 1989; Zimmerman & Martinez-Pans, 1990; Yıldırım, 2000), learning approaches (Goh, Wong, & Osman, 2012; Heikkila & Lonka, 2006; Onwuegbuize, Slate, & Swartz, 2001; Yıldız, Akpınar, & Ergin, 2006), and test anxiety (Akın, 2008; Birenbaum & Nasser, 1994) are important variables affecting student academic achievement. However, the studies conducted to examine the influence of student factor on academic achievement has been limited. Therefore, more research is needed to be conducted to examine student factor that contribute to explaining and understanding of the academic achievement. Besides, most studies about the effect of student factor such as motivation, self-efficacy, test anxiety on student achievement have been examined seperately. It has been seen that research studies to explore relationship between self-efficacy, motivation, learning approaches, test anxiety, and academic achievement are very limited (Fadlelmula, Çakıoğlu, & Sungur, 2013; Heikkila & Lonka, 2006; Kesici & Aşılıoğlu, 2017; Kusurkar et al., 2012; Yıldırım, 2011).

Theoretical Framework

According to Bandura's social cognitive learning theory, students who are motivated and able to use learning strategies effectively through self-regulated learning model are more likely to show better performance and achievement (Pintrich, 2000; Virtanen & Nevgi, 2010; Zimmerman, 1989). Self-reguated learners are behaviourally, metacognitively, motivationally active in their own learning (Zimmerman, 1989). Self-regulation has three cyclical interrelated phases; (1) planning and setting goals, (2) action, (3) self-reflection (Zimmerman, 1998). There are two components which are motivation and learning strategies for this learning model. Motivation is one of the most important

components of self-regulated learning. The model has three motivational behaviors. These components; (1) students' beliefs and self-efficacy to perform a task, (2) students' goals about the learning task, (3) students' emotion to the task (Pintrich & De Groot, 1990). Students' motivation is directly related with their self-management skills. Self-regulated learning related with students' self-determination which focus on intrinsic motivation of learning task. Student motivation towards learning task promotes high quality of learning (Ryan & Deci, 2000). Students' approaches to learning as motivational-strategic behaviors (Biggs, 2001) are also interdependent with self-regulation of learning (Heikkila & Lonka, 2006). Surface approach or deep approach to learning depends on students' perception of learning task and their motivation (Biggs, 1993). Students adopting deep learning approaches to learning are highly motivated and more aware of the learning task (Saljo, 1979). Research studies indicated that relationship has been established between motivation to learn, learning approaches, and academic achievement (Herrmann, McCune, & Bager-Elsborg, 2017; Kusurkar et al., 2013, Trigwell, Ashwin, & Millan, 2013).

Education System in Turkey

Academic achievement is one of the most important issues in the Turkish education system and policies. Ministry of National Education (MoNE) has the responsibility to plan, implement, and revise school curricula. Decisions and implemantations about national testing is also made by MoNE. Many changes and arrangements have been made in Turkish School System since 1997. Compulsory schooling was increased from 5 years to 8 years in 1997. Compulsory schooling was 8 years without break, secondary education was 4 years in that period. In 2012, compulsory schooling was extended to 12 years with 4+4+4 education system. Therefore, compulsory education period was increased as 4 years for primary education, 4 years for middle school education, and 4 years for high school education. During these changes in the Turkish education system, different methods were used for transitioning from middle school to high school. Currently, National High School Placement Exam and middle school GPA have become effective factors for transitioning from middle school to high school in Turkey.

TIMSS-R, PIRLS, PISA are important research projects used to assess international student achievement. The most comphrehensive of these projects is PISA (the program for international student assessment). The PISA is used to assess 15 year-old students' reading, mathematics, and science literacy. And also the contries participating in PISA have the oppurtunity to evaluate their education system by comparison with other countries. It has been seen that the students' average scores in Turkey taken in PISA 2006, 2009, 2012, and 2015 were lower than the students'scores in OECD countries. The PISA results revealed that there is a big difference between the secondery school students' academic achievement levels in Turkey. National testing (high school entrance exam) in Turkey also generally showed that secondary students' achievement levels are not at expected levels (Topçu, 2014). Academic achievement levels are not at expected level in Turkish Education System because of several reasons such as quality differences between schools, nationwide competitive examinations, socioeconomic differences, teacher-centered teaching etc. (Börkan & Bakış, 2016; Gelbal, 2008; Topçu, 2014). Several solutions have been taken to eliminate these problems. Reducing inequality between schools, increasing school enrollment rates for girls, adopting constructivist curriculum reform are important attempts in Turkish Education Sytem. Student-centered learning approach in constructivist curriculum is very important since it improves deep learning and academic achievement.

The purpose of this study was to investigate the structural relationships among motivation, deep learning approach, and academic achievement of middle school students in Turkey. The hypothesis model established with the theoretical structure was aimed to examine student factor influencing their academic achievement in detail. Due to lack of studies focusing on structural relationship among motivation, deep learning approach, and academic achievement, there is a need for further research. Therefore, this study was conducted in an attempt to explain the relationships among these variables based on the theoretical model.

Research Questions

1. What is the structural equation model explaining the relationships among motivation, deep learning approach, and academic achivement?

2. Does motivation influence academic achievement directly or indirectly through deep learning approach variable?

METHOD

Participants

The sample of the research consisted of 746 voluntary middle school students in Turkey. In total, 370 participants (49.6%) were female and 376 participants (50.4%) were male. Participants' ages ranged from 12 to 15. The average age of the participants was 13.48 (SD = 0.6). Participants were 7th grade [370; (49.6%)], and 8th grade [376; (50.4%)] students attending different public middle schools in Turkey. The study group was determined by convenience sampling. The data were collected in a manner consistent with ethical standards for use of human subjects in research.

Instruments

Data were collected via Motivated Strategies for Learning Questionnaire, Study Process Questionnaire (R-SPQ-2F), and Personal Information Form.

Motivated Strategies for Learning Questionnaire: Motivated Strategies for Learning Questionnaire was developed by Pintrich, Smith, Garcia and McKeachie (1993) and adapted to Turkish culture for 12-18 years old students by Karadeniz et al. (2008). The scale having 71 items with 7-point Likert type consists of two subscales: motivation and learning strategies. Motivation subscale was used from the Motivated Strategies for Learning Questionnaire in this study. Motivation subscale is composed of six factors: intrinsic goal orientation, extrinsic goal orientation, task value, self-efficacy, control beliefs, and test anxiety. The Cronbach alpha value was calculated for the motivation subscale in the present study (Cronbach alpha=.82). Study Process Questionnaire (R-SPQ-2F): The Study Process Questionnaire developed by Biggs, Kember, and Leung (2004) was adapted to Turkish culture for middle school students by Çolak and Fer (2007). The scale was composed of 22 items in 5-point Likert-type scale. It consists of two subscales: Deep learning approach and Surface learning approach. The deep learning approach subscale was used in the present study. The deep learning approach subscale consists of two factors: deep strategy and deep motivation. The deep learning approach subscale reliability was also calculated in the present study (Cronbach alpha= .77).

Information Form: In the personal information form, demographic information such as gender, age and grade point average were asked to the students.

Procedure and Data Analysis

The data obtained in the study were collected in a classroom environment at the schools. Descriptive statistics and structural equation model were used in the study. First, data were examined whether it is available for structural equation modeling (SEM) analyses. Multicollinearity and normality were examined for SEM analysis (Teo, Tsai, & Yang, 2013). The VIF values were below 10. This finding indicates that there is no multicollinearity in the data set (Kline, 2015). Skewness and kurtosis values were calculated for the assumption of normality. Skewness and kurtosis values between –2 and +2 are considered acceptable for normal distribution (George & Mallery, 2010). The skewness values of the variables vary between -.992 and .214, the kurtosis values vary between .517 and .864. The results indicated that the data were suitable for SEM analyses. According to Kline's

(2015) recommendation, χ^2/df ratio, SRMR, RMSEA, CFI, and TLI were calculated for evaluating the adequacy of the structural model. To support the significance of the indirect and direct effect of the variables included in SEM, a 95% confidence interval was selected and the Bootstrap analysis was applied through 10000 re-sampling (Preacher & Hayes 2008).

To investigate direct and indirect effects of motivational strategies through deep learning approach, mediation model was used. SEM analysis is used for testing mediation model. With mediation model, the effects of independent variables to dependent variable, and also the effect of mediator variable that explain the relationship between independent variables and dependent variables are investigated (Baron & Kenny, 1986; Koğar, 2015).

Baron & Kenny (1986) proposed three conditions to test mediation model: (1) significant relationship between the independent variable and the mediation variable is needed, (2) significant relationship between the mediation variable and dependent variable is needed, (3) relationship of independent variable to dependent variable diminishes when mediation model is added to the model.

RESULTS

Correlation analysis and descriptive statistics

Findings showing correlation coefficients and descriptive statistics between the scales and sub-scales were given in Table 1. As seen in Table 1, all variables significantly correlated, except for the relationship between test anxiety and intrinsic goal orientation (r = -.014, p = .693), task value (r = -.036, p = .324), self-efficacy (r = .059, p = .105), and academic achievment (r = .05, p = 0.185). As seen in Table 1, academic achievement was positively correlated with deep learning approach (r = .155, p <0.01), deep motivation (r = .146, p <0.01), deep strategy (r = .129, p <0.01), intrinsic goal orientation (r = .197, p <0.01), extrinsic goal orientation (r = .078, p <0.05), task value (r = .208, p <0.01), control beliefs (r = .173, p <0.01), self-efficacy (r = .334, p <0.01).

Table 1. Descriptive statistics and correlation analysis of variables

		1	2	3	4	5	6	7	8	9	10
1	Intrinsic goal orientation	1									
2	Extrinsic goal orientation	,258**	1								
3	Task value	,643**	,319**	1							
4	Control beliefs	,423**	,237**	,484**	1						
5	Self-efficacy	,624**	,321**	,633**	,437**	1					
6	Test anxiety	-,014	-,250**	-,036	-,075*	,059	1				
7	Deep learning approach	,561**	,225**	,566**	,307**	,563**	-,122**	1			
8	Deep motivation	,495**	,224**	,498**	,285**	,499**	-,130**	,919**	1		
9	Deep strategies	,506**	,170**	,514**	,259**	,506**	-,081*	,854**	,580**	1	
10	Academic achievement	,197**	,078*	,208**	,173**	,334**	,049	,155**	,146**	,129**	1
	Minimum	4,00	3,00	5,00	3,00	5,00	5,00	11,00	7,00	4,00	40,00
	Maximum	28,00	21,00	35,00	21,00	35,00	35,00	55,00	35,00	20,00	99,70
	Mean	20,55	16,51	27,38	16,73	25,30	18,22	36,56	23,39	13,17	84,24
	SD	4,73	3,67	5,53	3,14	6,22	6,30	7,60	4,86	3,67	11,69
	Skewness	-,515	-,815	-,773	-,817	-,638	,214	-,197	-,244	-,199	-,992
	Kurtosis	,042	,268	,327	,864	,175	-,268	-,023	,197	-,517	,476

Note. N= 746, ** p < 0.01; * p < 0.05

As seen in the Table1, significant relationship between independent variables (motivational strategies) and mediation variable (deep learning approach), and dependent variable (academic achievement), and also significant relationship between mediation variable (deep learning approach)

and dependent variable (academic achievement) exist. Since 14 out of 15 relationships between variables significantly exist, mediation model can be established between these variable. Therefore, indirect and direct paths from motivational variable through learning approach to academic performance were tested. In the first model, the full mediating role of deep learning approach in the relationship between motivation and academic achievement were tested. Indirect path coefficients from motivation through deep learning approach to academic achievement were examined. The tested model adequately fitted with the data ($\chi^2_{(12, N = 746)} = 60.996$, χ^2 / df = 5.083, $p < .001$; CFI = .98; TLI = .93; SRMR = .034; RMSEA = .074 CI (.056 - .093). And also with the addition of direct path from motivational variables to academic achievement, the modified model was tested. The tested model perfectly fitted with the data ($\chi^2_{(6, N = 746)} = 6.091$, χ^2 / df = 1,015, $p = .413$; CFI = 1.00; TLI = 1.00; SRMR = .009; RMSEA = .005 CI (.000 - .048). However, there were no statistically significant path coefficient between motivation strategies and academic achievement except the path from self-efficacy to achievement ($\beta = .34$, $p < .001$). The addition of direct path did not improve the hypothesized model. Therefore, the full mediating model was preferred because of the insignificant paths in the partial mediating model. These results generally showed that motivation strategies predicted indirectly academic achievement through learning approach. The standardized path coefficients for the model were presented in Figure 1.

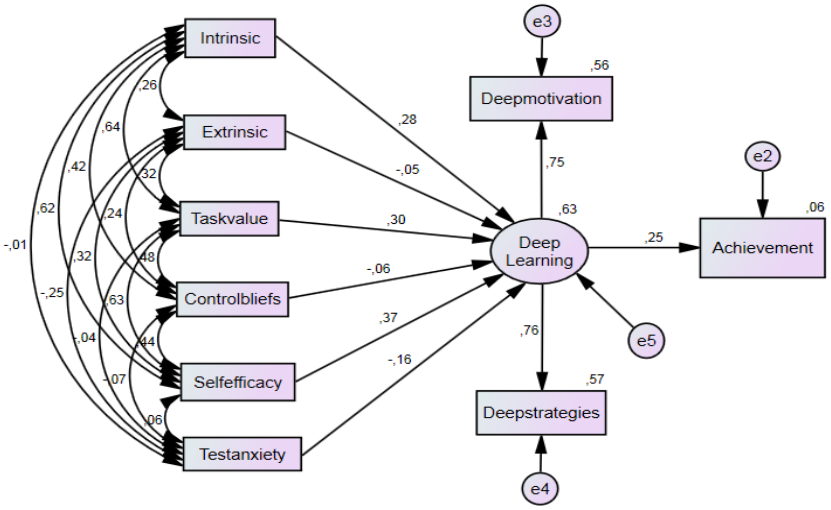

Figure 1. Standardized path coefficients for the model

To support the significance of the indirect effects of the motivation strategies to academic achievement, a 95% confidence interval was selected and the bootstrap analysis was applied through 10000 re-sampling. According to the SEM results, intrinsic goal orientation ($\beta = .28$, $p < .001$, 95% CI = .19, .37), task value ($\beta = .30$, $p < .001$, 95% CI = .20, .40), self-efficacy ($\beta = .37$, $p < .001$, 95% CI = .26, .48), test anxiety ($\beta = -.16$, $p < .001$, 95% CI = -.22, -.09) significantly predicted deep learning approach. Also deep learning approach ($\beta = .25$, $p < .001$, 95% CI = .16, .33) significantly predicted academic achievement. The results of the study generally imlpy that the indirect effect of intrinsic goal orientation ($\beta = .07$, $p < .001$, 95% CI = .04, .11), task value ($\beta = .08$, $p < .001$, 95% CI = .05, .12), self-efficacy ($\beta = .09$, $p < .001$, 95% CI = .05, .15), and test anxiety ($\beta = -.04$, $p < .001$, 95% CI = -.06, -.02) on academic achievement through deep learning approach were statistically significant. The standardized path coefficients for the Model are provided in Table 2.

Table 2 Standardized path coefficients and 95% CIs for the Model

					%95	
Direct Paths				Estimated	Lower	Upper
Intrinsic goal orientation	→	Deep learning		,279***	,188	,366
Extrinsic goal orientation	→	Deep learning		-,050	-,126	,026
Task value	→	Deep learning		,300***	,207	,398
Self-efficacy	→	Deep learning		,370***	,264	,481
Control beliefs	→	Deep learning		-,056	-,134	,021
Test anxiety	→	Deep learning		-,155***	-,224	-,087
Deep learning	→	Achievement		,249***	,159	,334
Indirect Paths						
Intrinsic goal orientation	→	Deep learning →	Achievement	,069***	041	,105
Task value	→	Deep learning →	Achievement	,075***	,045	,115
Self-efficacy	→	Deep learning →	Achievement	,092***	,050	,150
Test anxiety	→	Deep learning →	Achievement	-,039***	-,062	-,021

Note: *** $p < 0.001$

Motivation strategies explained 63% of variance in deep learning approach. However, deep learning approach explained 6% of variance in academic achievement. The independent variables (motivational strategies) were explained more variance than mediation variable (deep learning approach) on academic achievement. Therefore, the results showed that mediating relationship exist among these variables.

DISCUSSION AND CONCLUSION

This research examined the relationships among middle school students' motivation, deep learning approach, and academic achievement. It was found that motivational variables are related with the use of deep learning approach which is related with higher GPA. The results showed that deep learning fully mediated the relationship between students' motivational variables and academic achievement. Self-efficacy, task value, and intrinsic goal orientation (motivational variables) as the indirect effects through deep learning approach on academic achievement were strong predictors in the model. Deep learning approach as mediating the relationship between motivation strategies and academic achievement was also significant predictor on academic achievement. This is in line with theoretical model that self-determined students tending to demonstrate a high level of self efficacy, intrinsic motivation, task value and tending to have less academic anxiety (Deci & Ryan, 2000; Garcia & Pintrich, 1996; Gottfried, 1982, 1985) are more likely to adopt deep learning approach (Entwistle & Ramsden, 1983; Heikkila & Lonka, 2006; Rozendaal, Minnaert, & Boekaerts, 2005) and to have higher academic achievement. Similar studies have been done by using multi-variable analysis (e.g., structural equation modelling) to predict academic achievement (Drew & Watkins, 1998; Kusurkar et al., 2012; Lizzio, Wilson, & Simons, 2002; Zeegers, 2004). Findings of these studies were consistent with the present study that a positive relationship exists between deep learning approach and academic achivement. Trigwell, Aswin, and Millan (2013) also used multi-variable analysis to predict university students' academic achivement in UK. However, relationship between deep learning and academic achievement was not significant in the path analysis. They found that the effect of student motivation on their academic achievement were mediated with surface approach to learning. They generally found that among the strong predictors of academic achievement were surface approach to learning, self-efficacy, and motivation respectively. The present study indicated that self-efficacy which was mediated by deep learning approach has a stronger effect than other motivational variables. Similar studies also found that the effect of self-efficacy on academic achievement was mediated with deep learning approach (Fenollar, Roman, & Cuestas, 2007; Honicke, & Broadbent, 2016; Phan, 2009, 2010). Students with strong self-efficacy beliefs have higher goals, make a great effort to perform an academic task (Bandura, 1997). The students having high self-efficacy beliefs are more likely to adopt deep learning approach, to use learning strategies to perform a task succesfully (Heikkilä & Lonka, 2006; Zimmerman, 2000). The results of the study is parallel with prior studies that self-efficacy is one

of the most powerful motivational variable to predict academic achievement (Al-Harthy, Was, & Isaacson, 2010; Richardson, Abraham, & Bond, 2012).

This study has investigated the impact of some factors, specifically motivation and learning approach on middle school students' academic success. Since learning is a complex concept, using causal model (structural equation modelling) in the present study is important to represent this complexity of learning outcome. However, this study has some limitations. Other factors such as self-regulatory learning strategies, personality traits, demographic factors that may affect on academic achievement were not investigated in the present study. Therefore, there is a need for further research to determine the role of variables on student academic achievement. Besides, high academic achievement does not always reflect high quality of learning outcome (Scouller & Prosser, 1994). Students with high academic achievement may be assessed by using surface approach learning in education system. Therefore, developing a suitable learning environment is important to promote students' deep learning and motivation.

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